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IN THE

Supreme Court of the United States

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No. 6 Original

THE STATE OF NEBRASKA,
Complainant,

vs.

THE STATE OF WYOMING,
Defendant,

THE STATE OF COLORADO,
Impleaded Defendant,

UNITED STATES OF AMERICA,
Intervener.

BRIEF OF DEFENDANT, STATE OF WYOMING

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Special Counsel.

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BRIEF OF DEFENDANT, STATE OF WYOMING

INTRODUCTORY

The parties to this suit are the states of Nebraska, Wyoming and Colorado, and the United States of America. The record of the testimony comprises 29,500 typewritten pages and, in addition thereto, 1,288 exhibits. A Master's Report, comprising 273 pages, has been filed. For purposes of brevity, exhibits introduced by Nebraska, Wyoming, Colorado and the United States, will be respectively designated by the letters "N", "W", "C", and "US", followed by the number of the particular exhibit to which reference is made. References to the testimony will be designated by the word "Record" and to the Master's Report by the letters "M.R.". Refefences will also be made to an appendix hereto attached containing evidence from the record.

JURISDICTION

This is an original proceeding between states and the bill of complaint was filed by Nebraska upon authority granted therefor by this Court (293 U. S. 523). Jurisdiction is founded upon Section 2 of Article III of the Constitution of the United States, and Section 233 of the Judicial Code (28 U.S.C.A. 341).

The case involves the apportionment between states of the use of water of an interstate stream, and this Court has entertained jurisdiction in similar controversies, such as Kansas v. Colorado, 206 U.S. 46, and Wyoming v. Colorado, 259 U.S. 419.

STATEMENT OF THE CASE

A summary of the pleadings is contained at pages 3 and 4 of the Master's Report. In its bill of complaint, Nebraska charged Wyoming with diversion and use of more than her equitable share of the waters of the North Platte River, and prayed that the Court find and determine the equitable shares of the two States, and that Wyoming be compelled to permit the water of the stream to reach Nebraska in such quantity as would afford to that State its equitable apportionment thereof. Wyoming was permitted to file its amended and supplemental answer wherein the Nebraska charges were denied; the State of Colorado was sought to be impleaded, and prayer was made that the Court determine the equitable shares of the water of the North Platte River to which the States of Colorado, Wyoming and Nebraska are respectively entitled. By order of this Court Colorado was made a party (296 U.S. 553). Colorado filed an answer and cross bill against Nebraska and Wyoming, in which she denied any use or threatened use of the waters of the stream beyond her equitable share, and prayed that the Court determine the equitable shares and apportion the waters of the North Platte River between the States of Colorado, Nebraska and Wyoming. On these pleadings, supplemented by Wyoming's answer to the cross bill of the State of Colorado, Nebraska's replication to the answers of Wyoming and Colorado, and to the cross bill of the State of Colorado, and Colorado's replication to the answers of Nebraska and Wyoming to her cross bill, the litigant States are before the Court, each requesting the Court to make an equitable apportionment of the waters of the North Platte River.

The United States moved to intervene and was permitted so to do by order of this Court (304 U.S. 545). By its petition in intervention the United States alleged that it is the owner of the waters of the stream or of the rights to the use of same and prayed for a decree making such determination. Answers to the petition in intervention were separately filed by the litigant States, in all of which the contentions of the United States are denied.

In Nebraska's bill of complaint, second paragraph, it is alleged that the North Platte is a non-navigable river. This allegation is admitted in Wyoming's amended answer, second paragraph, in Colorado's answer, first paragraph, and the United States alleges in its petition for intervention, paragraph 1, that the North Platte River is a non-navigable stream. The waters of the North Platte are primarily used for irrigation, although power is produced at Seminoe and Guernsey reservoirs, and in connection with the Sutherland and Tri-County projects in Nebraska. There is no disagreement as to the use of water for power purposes in connection with these reservoirs, which are primarily utilized for irrigation, and the controversy relates wholly to the use of water for irrigation.

In his studies and conclusions the Master has divided the stream into the following sections (M.R. p. 7):

(1) North Park, Colorado;
(2) Colorado-Wyoming State Line to Pathfinder Reservoir;
(3) Pathfinder Reservoir to Whalen, Wyoming;
(4) Whalen, Wyoming to Tri-State Dam, Nebraska;
(5) Tri-State Dam to Kingsley Reservoir;
(6) Kingsley Reservoir to Grand Island.

In connection with section 3, it should be pointed out that this area is sometimes designated as Pathfinder to Whalen, and other times Pathfinder to Guernsey. Guernsey is the name of the reservoir located in the channel of the stream about eight miles above Whalen, which is the point of diversion of the Interstate and Fort Laramie canals of the North Platte project. There is no diversion or use of water between Guernsey and Whalen, and consequently the terms may be used interchangeably in designating the lower end of section 3.

The case is now before the Court upon exceptions of the parties to the report of Michael J. Doherty, Special Master. Since it is an original cause, with an unusually long record which has not been printed, the Wyoming exceptions herein filed are more specific and in greater detail than would ordinarily be the case. We have endeavored to point out with considerable exactitude the points of fact and law upon which we differ from the findings and conclusions of the Master. This Defendant accepts the findings and conclusions of fact of the Master as set

forth in his report, except as they are challenged by our exceptions. Under these circumstances it appears to us unnecessary to make an extended statement of the facts, as so to do would in large measure be merely a repetition of the factual findings of the Master.

The North Platte river originates in Colorado; the headwaters being approximately 70 miles south of the Wyoming-Colorado border. The stream enters Wyoming and traverses that state a distance of 437 miles; then enters Nebraska, and proceeds across that state a distance of about 185 miles to a point five miles east of the City of North Platte, where it unites with the South Platte River to form the Platte. Irrigation is practiced on the Platte as far east as Kearney, Nebraska, which is about 100 miles below North Platte. The case involves, and the testimony has covered, the use of water for irrigation purposes from the headwaters of the North Platte in Colorado to the City of Kearney, Nebraska, upon the Platte. Kearney, Nebraska is up stream from Grand Island, and therefore within section 6 as designated by the Master.

As to section 1, or that portion of the North Platte within the State of Colorado, the Master has found that Colorado should be permitted to irrigate 135,000 acres, use storage facilities not exceeding the accumulation of 17,000 acre feet in any water year, and to divert not more than 6,000 acre feet annually for trans-basin use, and has limited Colorado to such uses. Generally, the Master has referred to the Colorado section of the stream as North Park, Colorado, and such reference appears in his recommendations in paragraph 1, page 177 of his report. It must also be understood that the Laramie River is excluded from consideration, as the Master found an equitable apportionment, as to that stream, was made by this Court in Wyoming v. Colorado, 259 U.S. 419 (M.R. p. 8). The Laramie is a tributary of the North Platte, originating in Colorado, entering Wyoming and joining the North Platte at a point below Whalen in the latter State.

In down-stream order the next sections of the North Platte are 2 and 3, respectively designated Colorado-Wyoming State Line to Pathfinder Reservoir, and Pathfinder Reservoir to Whalen, Wyoming. As to section 2 the Master has found that in this area Wyoming should be permitted to irrigate presently existing acreage of 153,000 acres, and to store water in an amount not to exceed 18,000 acre feet in any water year, exclusive of the Semi-

noe Reservoir which is a unit of the Kendrick Project for the irrigation of lands below Pathfinder (M.R. p. 9; pp. 133-136; Par. 2, p. 177). As to section 3 the Master has found there need be no restriction upon irrigation in Wyoming from tributaries (M.R. p. 145), but that Wyoming should be limited to the irrigation of 15,000 acres from the main stream between Pathfinder and Whalen, exclusive of the Kendrick Project. Consequently, the Master recommends a restriction upon Wyoming of 168,000 acres, including all irrigation from the main stream and tributaries above Pathfinder and from the main stream between Pathfinder and Guernsey, or Whalen (M.R. par. 2, p. 177). The conclusion of the Master, stated at page 9 of his report, is that no restriction upon or interference with present uses of water in the North Platte basin in Wyoming between the Colorado-Wyoming state line and Guernsey, or Whalen, is necessary, and the recommended decree is designed to permit full exercise of present uses without restriction or limitation. This is exclusive of the Kendrick Project, which has two reservoirs—the Seminoe, which is above Pathfinder, and the Alcova, which is below, and the lands of which are located below Pathfinder.

The next section down stream is that from Whalen, or Guernsey, Wyoming, to Tri-State Dam, Nebraska, designated as number 4, and which covers approximately fifty miles and terminates at the Tri-State Dam, one mile below the Wyoming-Nebraska line. For this section the Master has made a determination of requirements of canals diverting therefrom, and recommends the imposition of such regulation as is incorporated in paragraphs 3, 4 and 6 of the recommendations for decree at pages 177 to 179 of his report. As to this section, Wyoming disagrees with the Master's recommendations, believing that he has erred in treating the problem as one between canals, projects and groups of canals instead of one between states, and that instead of the proposed administration between projects, canals and groups of canals, there should be a mass allocation of supply between Nebraska and Wyoming. Interrelated with the treatment given by the Master to the Whalen—Tri-State Dam section, is that accorded to the Kendrick project and to the question of storage of water in the Pathfinder, Seminoe and Alcova reservoirs, which serve the North Platte and Kendrick projects. Here again Wyoming disagrees with the Master's proposed treatment of the situation as one between individual reservoirs, projects, canals and groups of canals, and asserts

that there must be an apportionment between the two states.

The remaining two sections of the stream are 5 and 6, designated respectively, Tri-State Dam to Kingsley Reservoir, and Kingsley Reservoir to Grand Island. As to these, the Master has found that their requirements can be adequately supplied by return flows and local supplies, and that Nebraska has no claim upon Wyoming or Colorado to supply any water for diversion at any point below the Tri-State Dam (M.R. par. 5, p. 9; pp. 92-99).

This Defendant is in agreement with the findings and conclusions of the Master and his recommendations as to sections 1 and 2, comprising the Colorado area and that in Wyoming above Pathfinder Reservoir, and also as to sections 5 and 6, comprising the area in Nebraska below Tri-State Dam. As to section 3, Pathfinder Reservoir to Whalen, Wyoming, this Defendant agrees with the findings and conclusions of the Master that no restriction or regulation of use from tributaries is required, and also agrees to the limitation upon Wyoming to the irrigation of not more than 15,000 acres from the main stream, exclusive of the Kendrick project. This Defendant disagrees with the findings and conclusions of the Master, and his recommendations, as to the Kendrick project and the Whalen-Tri-State Dam section, it being our position that in respect thereto a mass allocation of supply, based upon seasonal quantities in acre feet, should be made between Wyoming and Nebraska, instead of the proposed administration contained in paragraphs 3, 4 and 6 of the recommendations for decree at pages 177 to 179 of the Master's Report. Further, it is Wyoming's position that the requirement for Nebraska lands of canals diverting in the Whalen-Tri-State Dam section, should be reduced.

The claims and contentions of the United States, as set forth in its petition of intervention, have been denied by the Master, as disclosed in his report, pages 165 to 177 inclusive. By such decision the Master has agreed with the position taken by each of the litigant states, including this defendant.

The case now to be presented by Wyoming and argued in this brief, is based upon the Wyoming exceptions to the Master's Report. The exact point of disagreement of Wyoming from the conclusions and recommendations of the Master, as above stated, relates to the disposition of the case as to the use of water in the Whalen-Tri-State Dame section and for the Kendrick project. Coupled therewith is the question of the use of

storage supplies of the Pathfinder, Seminoe and Alcova reservoirs. Since the facts found by the Master are accepted by this Defendant, except as they are questioned by our exceptions, and since the area of controversy between our position and the recommendations of the Master is limited as hereinabove specified, it appears unnecessary to make any more extended statement of the case at this point. The details of our differences with the Master's Report will be developed in the succeeding specification of points to be urged and the argument following.

SPECIFICATION OF EXCEPTIONS TO BE URGED

Certain of the Wyoming exceptions, such as those numbered I to V inclusive and VII and VIII relate only to errors which should be corrected in support of the ultimate conclusions and recommendations of the Master, and are a matter of defense by Wyoming against claims that may be urged by other litigants. Such exceptions are not the basis upon which this Defendant predicates any claim for change in the ultimate conclusions, or in the recommendations for decree of the Master.

The exceptions which this Defendant will urge as the basis for modification of the Master's recommendations for decree are as follows:

1. The water supply of the years 1895 to 1940 inclusive, comprising the entire period covered by the evidence, was adequate, assuming utilization of presently existing reservoirs, and assuming all present uses, including the Kendrick Project, to supply all of the demands upon the stream, including the Kendrick, and the dependable supply, based upon the production of such forty-six year period, is adequate to meet all such requirements. (Exceptions IX to XVII inclusive, and paragraphs 11 and 12 of Exception XXVII.)

2. A mass allocation of the water supply should be made in the Whalen-Tri-State Dam section and for the Kendrick Project between the states of Nebraska and Wyoming, alloting to each seasonal quantities in acre feet for use in the May-September period, and limiting each to the use of such supplies, and shortages, if any occur, should be sustained by the states in proportion to the respective allotments. Equitable apportionment between Nebraska and Wyoming should be based solely upon the rights of the states, and not upon the rights of, or rela-

tionship between propects, reservoirs, individual canals or groups of canals. (Paragraphs 1 to 4 inclusive of Exception XXVII.)

3. Accurate segregation of natural flow and storage is impossible, and segregation is not, and should not be, a necessary element in apportionment between the states of Nebraska and Wyoming. (Exceptions XVIII and XIX, and paragraphs 7 and 8 of Exception XXVII.)

4. Storage water used in the Whalen-Tri-State Dam section and comprising more than half of the supply must be apportioned between Nebraska and Wyoming, and apportionment between these two states must also take into account storage supplies of the Kendrick project. (Exceptions XX to XXII inclusive, and paragraphs 5 and 6 of Exception XXVII.)

5. Joint operation of storage reservoirs of the North Platte and Kendrick Projects, comprising the Pathfinder, Seminoe and Alcova, and the pooling of storage supplies, should not be prohibited. (Exception XXIII, and paragraph 9 of Exception XXVII.)

6. As part of a mass allocation between Nebraska and Wyoming as to the Whalen-Tri-State Dam section, and the Kendrick Project, there should be included in the allotment to Wyoming a diversion requirement of 168,000 acre feet for the Kendrick Project. (Exception XXV and paragraph 3 of Exception XXVII.)

7. The May-September requirement for Nebraska lands of canals diverting in the Whalen-Tri-State Dam section should be reduced 85,000 acre feet. (Exception VI and paragraphs 3 and 10 of Exception XXVII.)

8. The restriction upon use of return flows of the Kendrick Project, contained in paragraph 5 of the Master's recommendations for decree, should be eliminated. (Exception XXVIII.)

9. A complete equitable apportionment between the litigant states should be made. (Exceptions XXIX, XXXI, and XXXII.)

10. The Decree. A Decree should be entered making an equitable apportionment between the States and determining their relative rights, without fixing, or purporting to fix, the rights of individual canals or projects.

SUMMARY OF THE ARGUMENT

Briefly summarized, the argument of this Defendant is as follows:

1. The available and dependable water supply of the North Platte River can be determined only by taking into account the ability and purpose of the reservoirs of the North Platte and Kendrick Projects for the conservation and carry-over of storage water from year to year. Equitable apportionment between Nebraska and Wyoming, as to the Whalen-Tri-State Dam section and the Kendrick Project, should not be based upon temporary conditions of supply existing during the 1931-1940 decade, but should be founded on water production of all years for which information is supplied by the evidence, comprising the period 1895 to 1940 inclusive. The water supply of said period 1895 to 1940, inclusive, was adequate, assuming utilization of presently existing reservoirs, to supply the requirements of the Whalen-Tri-State Dam section and the Kendrick Project, in addition to all other present uses.

2. Between the states of Nebraska and Wyoming, a mass allocation of water supply should be made for the Whalen-Tri-State Dam section and for the Kendrick Project, alloting to each state such seasonal quantities in acre feet for use in the May-September irrigation season as are necessary, and limiting each to the use of such supplies. Shortages, if any occur, should be sustained by the states in proportion to the respective allotments. Equitable apportionment between Nebraska and Wyoming should be based solely upon the rights of the states, and not upon the rights of, or relationship between, individual projects, reservoirs, or groups of canals.

3. A mass allocation of natural flow based upon percentage, such as is proposed in paragraph 6 of the Master's recommendations for decree (M.R. p. 179), can not be made for the reason that it is impossible to determine the amount of natural flow in the Whalen-Tri-State Dam section at any time. Because of the impossibility of accurate segregation of natural flow and storage, such segregation should not be a necessary component of equitable apportionment between the states.

4. More than half of the total water supply used in the Whalen-Tri-State Dam section is storage water, and a division

between Nebraska and Wyoming of this supply should be included in apportionment between the two states. Storage supplies of the Kendrick Project should also be included in such apportionment.

5. Joint operation of the storage reservoirs of the North Platte and Kendrick Projects, and the pooling of natural flow and storage supplies is advantageous, and should not be prohibited by the Decree.

6. The water supply, as it occurred during the years 1895 to 1940 inclusive, comprising the entire period covered by the water supply studies in the case, was adequate to take care of all existing uses and for the Kendrick Project, and an allotment should be made to Wyoming of the diversion requirement of the Kendrick in the amount of 168,000 acre feet.

7. The requirement for Nebraska lands of canals diverting in the Whalen-Tri-State Dam section is excessive and should be reduced 85,000 acre feet.

8. The proposed restrictions upon the use of return flows of the Kendrick Project, contained in paragraph 5 of the Master's recommendations for decree (M.R. p. 178), are unnecessary and inequitable, and should be eliminated.

9. Any decree entered should comprise a complete equitable apportionment between the litigant states.

10. A decree should be entered between the litigant states making an equitable apportionment by means of mass allocation, and determining the rights solely of the states, and not fixing or based upon the rights of individual canals or projects.

THE ARGUMENT

1. THE WATER SUPPLY

Applicable Principles

Determination of the available and dependable water supply is a necessary foundation for equitable apportionment between states. The principles to be applied in the determination of what is the available and dependable supply are set forth in Wyoming v. Colorado, 259 U.S. 419, 66 L. Ed. 999, as follows:

of reservoirs adapted to conserving and equalizing the

"But we are of opinion that the computation and conclusion of the witness, even when revised in the way we have indicated, are based too much on the average flow, and not enough on the unalterable need for a supply which is fairly constant and dependable, or is susceptable of being made so by storage and conservation within practicable limits. By this is not meant that known conditions must be such as give assurance that there will be no deficiency even during long periods, but rather that a supply which is likely to be intermittent, or to be materially deficient at relatively short intervals, does not meet the test of practical ayailability. As we understand it, substantial stability in the supply is essential to successful reclamation and irrigation. The evidence shows that this is so, and it is fully recognized in the literature on the subject." (p. 480.)

"We conclude, in view of all the evidence, and of several considerations we have stated, that the natural and varying flow of this stream at Woods, which is after the recognized Colorado appropriations are satisfied, is susceptible, by means of practicable storage and conservation, of being converted into a fairly constant and dependable flow of 170,000 acre-feet per year, but not more. This we hold to be the available supply at that point after the recognized Colorado diversions are made. The amount may seem large, but considering what may be accomplished with practicable storage facilities, such as are already provided, and the use which may be made of the return water, we are persuaded that the amount, while closely pressing the outside limit, is not too large." (pp. 485, 486.)

In the light of these rules, we turn to the Master's report in the instant case. Paragraph 10 at page 10 of his report is as follows:

"The foregoing conclusions 6, 7, 8 and 9 assume that an apportionment now made should be based primarily upon the conditions of water supply which have prevailed since 1930. Recommendation is further made of retention by the Court of jurisdiction to amend the decree upon a showing of such change of conditions as might render the operation of the decree inequitable.

> This recommendation contemplates particularly the possibility of the passing of the present drouth cycle and the future availablity of far greater water supplies, comparable with those of former years which might justify a release of some or all of the restrictions now proposed. Many elements of uncertainty and probable impermanence in the present situation argue either for a dismissal of the suit or a decree with provision for such retention of jurisdiction. The reasons favoring a decree appear the stronger."

At page 122 of his report he states that he favors the entry of a decree based primarily on present conditions, with retention of jurisdiction to modify the decree on a showing of such change of conditions at to render operation of the decree inequitable and requiring its amendment. The present conditions, mentioned at page 122, is no doubt a reference consistent with that in the paragraph above quoted, to-wit: conditions of water supply since 1930.

At pages 39 and 40 of the Master's Report, the run-off at Pathfinder Reservoir, which is the focal point of supply and may be considered to accurately measure supply conditions, is evaluated in percentages for the years 1931 to 1940 in relation to the 1904 to 1940 average, and it is found that the average of the 10 years 1931 to 1940 is only 71 per cent of the 1904 to 1940 mean. This Court, in Wyoming v. Colorado, supra, did not make a division of the water supply of the Laramie River based upon the flow of any one year, or selected period of consecutive years of unusually low run-off. Further, in connection with the problem this Court, in that case, said:

> "We already have indicated that, as to such a stream as this, the average flow of all years, high and low, cannot be taken as a proper or reasonable measure of what is available for practical use. What, then, is the amount which is available here? According to the general consensus of opinion among practical irrigators and experienced irrigation engineers, the lowest natural flow of the years is not the test. In practice they proceed on the view that within limits financiallyy and physically feasible, a fairly constant and dependable flow materially in excess of the lowest may generally be obtained by means natural flow; and we regard this view as reasonable." (pp. 483, 484.)

In the Laramie River case, Wyoming v. Colorado, supra, reservoir construction was available only in the lower State, Wyoming, as appears from the opinion, pages 484 and 485. The situation is otherwise in the present cause as large reservoir construction is available in Wyoming for use of appropriators in both Woming and Nebraska. There is no reservoir construction in Colorado which is utilized in either Wyoming or Nebraska. As to Nebraska, Kingsley and Sutherland Reservoirs are in operation, but their supply is used solely in that state. In this case we must therefore turn our attention to reservoir facilities in Wyoming, the supplies of which are largely used in Nebraska. In accordance with the principles above quoted, a determination must be made of the supply of the North Platte River which can be made available by utilization of existing reservoirs, and which is of such dependable character as is defined by this Court in its opinion in Wyoming v. Colorado.

Reservoir System of North Platte and Kendrick Projects

Reservoir use above Pathfinder is quite negligible, there being capacity of only 17,000 acre feet in Colorado and 18,000 acre feet in Wyoming (M.R. p. 177). In the Wyoming area there are a large number of reservoirs of small capacity, (M.R. p. 49) and this is the situation in Colorado. In relation to the area irrigated in Colorado of 135,000 acres and in Wyoming, above Pathfinder, of 153,000 acres, (M.R. p. 135) the use of reservoir supplies is insignificant. These small reservoirs do not fill every year, and there is no hold-over of supply from year to year of any consequence (M.R. p. 49). The sections Pathfinder to Whalen, and Whalen to Tri-State Dam, in contrast to the areas above, are sections of large reservoir construction and heavy utilization of storage supplies. The Pathfinder for the North Platte, and the Seminoe and Alcova for the Kendrick, are the upper storage reservoirs of the North Platte and Kendrick Projects. Data concerning same from the Master's Report, pages 30, 35, and 53, and from the Engineers' Stipulation, pages 5 and 6, may be conveniently tabulated as follows:

	Miles up-stream from Whalen	Miles up-stream from Tri-State Dam	Capacity in acre-feet	Commence-ment of Operation
Seminoe	240	283	1,026,000	April 1939
Pathfinder	210	253	1,045,000	April 1909
Alcova	197	240	190,000	February 1938

The information from the Engineers' Stipulation is shown in the appendix hereto, page 1.

Whalen is the point of diversion of main canals of the North Platte Project, and the highest point on the stream at which diversions are made of North Platte Project supplies. Tri-State Dam is the point of diversion of the Tri-State and Northport canals, located one mile below the Wyoming-Nebraska line, and the lowest point on the stream at which diversions are made of North Platte Project supplies, since the Court has found that return flows and local supplies are adequate for all requirements below and up-stream supplies are unnecessary for diversion at any lower place on the stream (M.R.. pp. 9, 92, 103). The diversion for the Kendrick Project, served by Seminoe and Alcova Reservoirs, is at Alcova. Consequently, storage supplies of these three reservoirs are all utilized between Alcova and Tri-State Dam. Alcova is the lower on the stream of the three reservoirs and the point of diversion for the Kendrick Project and of discharge into the river of all supplies used in the Whalen-Tri-State Dam section. It is 240 miles above Tri-State Dam and 197 above Whalen. The section, Whalen to Tri-State Dam, wherein all diversions are made for the North Platte Project, is 43 miles in length.

The Pathfinder Reservoir used in connection with the North Platte Project was designed and has been employed, not merely for the purpose of retaining winter flows for use in the succeeding irrigation season, but for the capture and storage of the run-off of a peak year or years, and its conservation for use in a succeeding year, or years, of low production. How it operated in this respect is disclosed by carry-over storage at the end of September of each year, since the May-September months ordinarily measure the irrigation season, and storage on September 30th is conserved for use in the following year. September 30th is also the end of the "water year" (M.R. p. 6). Carry-over storage from the end of one irrigation season for use

in the next is disclosed by storage in Pathfinder Reservoir September 30th each year for the period from its completion in 1913 to 1939, shown on C-99, as follows:

Year	Acre Feet	Year	Acre Feet
1913	208,950	1927	504,260
1914	377,960	1928	419,610
1915	276,870	1929	533,540
1916	314,070	1930	334,440
1917	646,810	1931	0
1918	567,540	1932	158,700
1919	232,900	1933	121,670
1920	658,890	1934	3,230
1921	577,380	1935	5,720
1922	304,020	1936	8,320
1923	656,840	1937	63,200
1924	208,270	1938	247,440
1925	120,500	1939	6,170
1926	398,690		

Combined capacity of the Kendrick Project Reservoirs, Seminoe and Alcova, is 1,216,000 acre feet. May-September net consumptive use of this Project as disclosed at pages 138 and 142 of the Master's Report is as follows:

Evaporation Loss	40,000 acre feet
Head-gate Diversion	168,000 acre feet
Total	208,000 acre feet
Less May-September return flow	46,000 acre feet
Net May-September consumptive use	162,000 acre feet

Since the May-September, or irrigation season, net consumptive use of the Kendrick is 162,000 acre feet, and the combined capacity of its storage reservoirs 1,216,000, the storage capacity is over seven times the May-September requirement. Therefore, when Seminoe and Alcova Reservoirs are full there is in storage a supply for the Kendrick Project adequate for seven years.

In the Wyoming water supply study covering the period from 1904 to 1940, comprised in Wyoming Exhibits 170 to 176 inclusive and which will be fully discussed hereafter, a demand was placed against the stream slightly in excess of the Master's

proposed May-September requirement below Whalen of 1,027,000 acre feet (M.R. p. 61), and it was found that if Seminoe and Alcova Reservoirs, together with Pathfinder, had been in continuous operation from 1904 to 1940, the demand imposed would have been met, and also the full requirement of the Kendrick Project, with a surplus at the end of the period in the three upper reservoirs of 169,300 acre feet. In addition, as disclosed by W-176, there would have been reservoir spills in 21 of the 37 years. In other words, during this 37 year period there would have been 21 years in which all of the upper reservoirs; Seminoe, Pathfinder and Alcova, would have been full, and succeeding any one of these 21 years in which spills occurred, the Kendrick Project could have been supplied for approximately seven following years without any new production.

The spills above referred to in 21 of the 37 years, are reflected in Wyoming Exhibit 176, copy of which appears in the appendix hereto, pages 2 to 20 inclusive. Said exhibit also discloses the carry-over storage on September 30th of each year during the period 1904 to 1940. It appears that if the three reservoirs and the Kendrick Project had been in operation during the 37 year period, carry-over storage September 30th each year would have been as follows:

Year	Acre Feet	Year	Acre Feet
1904	352,000	1923	1,938,300
1905	671,900	1924	1,603,200
1906	1,101,800	1925	1,731,200
1907	2,036,100	1926	1,762,800
1908	1,775,700	1927	1,794,900
1909	2,013,700	1928	1,755,200
1910	1,467,800	1929	1,832,900
1911	1,400,800	1930	1,632,600
1912	1,898,000	1931	1,816,300
1913	1,542,100	1932	1,684,900
1914	1,660,000	1933	1,673,400
1915	1,625,300	1934	970,600
1916	1,671,100	1935	694,100
1917	2,005,000	1936	597,700
1918	1,893,000	1937	744,400
1919	1,492,500	1938	1,008,800
1920	1,359,300	1939	667,600
1921	1,783,600	1940	169,300
1922	1,618,900		

All values on exhibit 176 are in thousands of acre feet and the addition of two ciphers is necessary to show actual quantities.

It must be pointed out, of course, that the above values are based upon utilization of all three reservoirs for the entire period, and the irrigation of the lands of the Kendrick Project, and the use of only as much water as the Master has proposed for the Whalen-Tri-State Dam section, to-wit: 1,027,000 acre feet in the May-September period. What occurred historically is far different because Seminoe and Alcova Reservoirs commenced operations only in 1938 and 1939, and also because the water conveyed to the Whalen-Tri-State Dam section in the May-September period of many years from 1931 to 1940 was far in excess of that necessary to meet the Master's proposed requirement. What we point out is that with operation of the three reservoirs, which will be operative in the future, and with restriction of use in the Whalen-Tri-State Dam section to such requirement as is proposed by the Master, and assuming a run-off or water production in the future of the same quantity as that occurring in 1904 to 1940, carry-over storage will be as portrayed in the above tabulation. No one can predict, with accuracy, future water supply, but engineers and experts are all agreed that we can only assume that what has occurred in the past will recur in the future. There is no evidence of any permanent change in the course of nature.

Carry-over storage from one year, or a series of years, of plentiful supply to a succeeding year, or series of years, of deficient supply is a distinguishing feature of this case, particularly in relation to the demands of the Whalen-Tri-State Dam section and the Kendrick Project. Fulfillment of requirements does not depend upon the flow of the stream each year as it occurs. Therefore, in comparing requirement with supplies, study must be made of a series of years, and it is erroneous to attempt to say what particular flow in any particular year is a sufficient flow, or one which measures the ability of the stream to meet the demands upon it.

This all leads to the conclusion that we must determine, not what may be the dependable flow based upon the actual run-off of a particular year or series of years, but what is the dependable supply based upon all of the information available as to run-off in past years, with particular emphasis upon what amount of water can be applied to the satisfaction of demands upon the stream by utilization of existing reservoirs. Because

of the element of carry-over storage, the flow of a particular year, or what might be determined to be a dependable annual flow, is not the measure of the stream's ability to meet demands, and we must determine what the dependable supply is; that is to say, how much water can be furnished each year to meet requirements from the production of a series of years conserved and carried over by reservoir use. The principles applicable we find set forth in Wyoming v. Colorado supra, but in that case, since there was no reservoir conservation in the upper state and no carry-over storage from year to year, it was found adequate to determine the dependable flow of the stream. The same principles should be applied here, but the "dependable supply" instead of "dependable flow" should be ascertained. In the language of the opinion in that case, it is the "supply which is fairly constant and dependable, or is susceptible of being made so by storage and conservation within parcticable limits" which should govern. We need not here be concerned with the question of practicability, as the storage reservoirs are in actual existence.

The storage capacity of the three upper reservoirs, which we have been discussing, as set forth by the Master, is 175% of the long-time average run-off of the stream at Pathfinder Reservoir (M.R. p. 36). The run-off at Pathfinder is extremely variable, having been as low as 382,200 acre feet in 1934, and as high as 2,399,400 acre feet in 1917 (M.R. p. 23). A 37 year average, 1904 to 1940, as determined by the Master was 1,315,900 acre feet (M.R. p. 24). Total capacity of the three reservoirs, as disclosed by the Engineers' Stipulation and set forth in a tabulation hereinabove is 2,261,000 acre feet. These reservoirs are very obviously designed for the purpose of carrying over storage from one year to the next and the stream can not be beneficially utilized unless they are so employed. To make such use, the down-stream diversion each May-Septemeber period must be limited to actual requirements, and surplus supplies retained in the reservoirs for succeeding years.

Guernsey Reservoir (M.R. p. 30), is located a few miles above Whalen and is used primarily for regulatory purposes, while Lakes Alice and Minatare (M.R. p. 30) are located in Nebraska, and used in connection with the Interstate Canal. These three reservoirs are all used in connection with the North Platte Project, but are comparatively small in size, and not particularly useful for conservation of supplies from year to year.

Available and Dependable Supply.

What is the available and dependable water supply of the North Platte River? Is it such a supply as will permit all existing uses in Colorado and in Wyoming on all tributaries and on the main stream above Whalen, and furnish a May-September requirement of 1,027,000 acre feet as proposed by the Master (M.R. p. 61) for use in the Whalen-Tri-State Dam section, and 168,000 acre feet for the Kendrick Project? We think the record indisputably shows that it is.

That any water supply study must be based upon actual run-off, or production of the years for which such information is available, is self evident. 1904 is the first year in which the flow of the North Platte at Pathfinder Reservoir was recorded, and continuous recordings were made from 1904 to 1940 inclusive, not alone at Pathfinder but at a number of other gauging stations. We mention 1940 because the evidence in this case was concluded in 1941, and 1940 is the last year covered by any water supply study. A second element which must be considered is irrigation consumption or use under present conditions, as obviously the run-off of the early years has been somewhat diminished by consumptive use upon lands developed from time to time. Therefore, insofar as the North Platte is concerned, recorded run-off or production values were avalable for use in water supply studies for the years 1904 to 1940, but it was necessary to make such reduction in these recorded values as would represent the amount of run-off under present conditions of development. We think it unnecessary to explain the method by which this was accomplished, as that employed was recognized by the expert witnesses of the different litigants as being appropriate.

Wyoming was the only litigant which presented a water supply study covering the entire period of 1904 to 1940, and assuming throughout that period the existence of all three storage reservoirs of the North Platte and Kendrick Projects, Pathfinder, Seminoe and Alcova, and assuming irrigation of the Kendrick Project throughout the entire period. Any water supply study, to be of value, must, of course, be based upon the assumption of the use of these three reservoirs, as they are now in actual existence and will be utilized during any future period. Any study must likewise assume the development of the Kendrick Project, for the reason that the diversion requirements thereof and return flows must be taken into account.

The Wyoming water supply study, presented by witness Elmer K. Nelson and comprised in Wyoming exhibits numbered 170 to 176 inclusive, uses as a basis of supply the actual run-off of the years 1904 to 1940 inclusive, reduced to represent present conditions of development as to present irrigation in Colorado, in Wyoming on all tributaries, and upon the main stream above Guernsey, exclusive of the Kendrick Project. Since the Master has determined that all present uses in Colorado, and those upon tributaries in Wyoming and upon the main stream above Guernsey, exclusive of the Kendrick Project, should be enjoyed without restriction, but that additional development should be enjoined, the assumption of the Wyoming study agrees exactly with the findings and conclusions of the Master. However, in the Wyoming study an allowance was made for additional depletion above Pathfinder of 68,500 acre feet annually (M.R. p. 65). The Whalen-Tri-State Dam seasonal requirement of the Wyoming study was 950,000 acre feet, while that proposed by the Master is 1,027,000 (M.R. p. 65). The testimony set forth in the appendix hereto attached, relating to Wyoming Exhibit 176, and the exhibit itself, disclose that the Wyoming study also made allowance for an October-April release of 10,000 acre feet at Pathfinder (Record p. 27,576, Appendix p. 23). The assumed demand upon the stream of the Wyoming study therefore is 950,000 acre feet for the Whalen-Tri-State Dam section, 68,500 for additional depletion above Pathfinder, and 10,000 for winter release, or a total of 1,028,500 acre feet. This is 1,500 acre feet in excess of the demand proposed by the Master, and consequently the conclusions of the Wyoming study are not disturbed if the Master's proposed requirement is substituted. It should be pointed out that the figures above given do not include a winter diversion at Whalen of 46,000 acre feet for Lakes Alice and Minatare reservoirs proposed by the Master (M.R. p. 61), or a similar diversion of 65,000 acre feet proposed by Wyoming (M.R. p. 60). Neither of these values affects the ultimate conclusions because a diversion of either amount in the winter months can be made without any release from the upper storage reservoirs for that purpose.

As above stated, the Wyoming study is predicated upon the use of run-off as it actually occurred, reduced to accord with what it will be in the future under present conditions of development. Wyoming Exhibit 170 shows the run-off for the years 1904 to 1940 inclusive at Pathfinder Reservoir, and at a

number of other points on the stream between Northgate, Colorado, and Guernsey, Wyoming. The direct testimony of the witness Mr. Nelson concerning this exhibit appears in the appendix at pages 27 to 34, and the exhibit itself at pages 35 to 39. All values on this exhibit are in thousands of acre feet and the addition of two ciphers is necessary to make actual amounts. Means of the 37 years are shown in lines at the bottom of the exhibit, one of which reflects run-off as it actually occurred, and the other as it would be under present conditions.

At page 138 of the Master's Report it is found that a headgate diversion of 168,000 acre feet is necessary for the Kendrick Project and that the return flow will be 96,000 acre feet annually, 46,000 in the May-September period and 50,000 between October and April. These same values were used in the Wyoming study, as disclosed by Wyoming Exhibit 171, copy of which appears in the appendix at page 40.

To develop an analysis of the supply and its use, the amount of water necessary for release at Alcova for the use of the Whalen-Tri-State Dam section must be determined, and this can only be done by taking into account supplies that will be available between Alcova and Tri-State Dam as they occur from year to year. Such supplies include the gain in the stream from Pathfinder to Whalen, the contribution of the Laramie River, which enters the stream below Whalen, the accretion to the stream below Whalen, and return flow of the Kendrick Project. These values must be considered for the May-September period as supplies in the winter months are not usable for irrigation except below Tri-State Dam. The nature of the supplies from the Laramie River is indicated by Table III, page 67 of the Master's Report, although the values there given are only for the drouth period 1931 to 1940, and are somewhat higher in years of better run-off. The accretions below Whalen, designated "Whalen State Line Usable Net Accretions" are also shown in Table III above mentioned for the years 1931 to 1940, the average there being 63,220 acre feet. Here again, it should be pointed out that somewhat larger supplies are available in years of more plentiful precipitation. The return flow of the Kendrick Project, used in the Wyoming study, is that shown on Wyoming exhibit 171, hereinabove referred to and appearing at page 40 of the appendix. This leaves for consideration the accretion to the stream between Pathfinder and Whalen, and with reference thereto an error appears in the Master's Re-

port, page 53, as pointed out in our exception number XII. The average historical gain from Pathfinder to Whalen is shown on Wyoming exhibit 173 for the 1904-1940 period, and also the average of the 1931-1940 period. The lines upon said exhibit showing such accretions for the May- September period and annually, are reproduced in the appendix hereto at page 40. Therefrom it appears that the 1904-1940 annual average was 287,000 acre feet, and that of the 1931-1940 decade 184,500 acre feet, and respective May-September averages, 141,000 and 69,300 acre feet. These average values are brought to the attention of the Court solely for the purpose of giving some conception of the quantities of water involved. They vary greatly from month to month and year to year, and in the Wyoming study they were used as they actually occurred, and the averages were not employed for the purpose of determining ability of supply to meet demands.

By taking into account available supplies below Alcova a determination was made each month of the May-September period of the amount of water required to be released at Alcova in order to supply the needs of the Whalen-Tri-State Dam section, and this quantity appears in column 8 of Wyoming exhibit 176, appendix pages 2 to 20. It is to be observed, of course, that the quantity varies from month to month and from year to year, and this is because of the difference in contributions to the supply below Alcova. Column 7 of the same exhibit portrays the demand of the Kendrick Project, and the required release each month to supply same. The division between the months May to September inclusive, as reflected in columns 7 and 8, was made in accordance with the monthly schedule therefor, described as ideal at page 82 of the Master's Report and comprising 11 per cent in May, 24 per cent in June, 26 per cent in July, 24 per cent in August and 15 per cent in September, all derived from Wyoming Exhibit 159.

The concluding exhibit of the Wyoming study is 176, direct testimony concerning which appears in the appendix hereto, pages 21 to 27. The exhibit itself appears in the appendix at pages 2 to 20, and, as above stated, all values are in thousands of acre feet requiring the addition of two ciphers to each to show actual amounts. This exhibit shows the storage at the beginning and at the end of each month in the upper storage reservoirs in columns 2 and 3, the run-off at Pathfinder in column 1, the reservoir losses by evaporation in column 5, the

required release for the Kendrick Project in column 7; for the Whalen-Tri-State Dam section in column 8, and in column 4 the combined discharge at Alcova, being the sum of columns 7 and 8 for each month. The exhibit covers each of the 37 years, 1904 to 1940, and month by month during the May-September period. Storage reservoirs are empty at the beginning of the period, October 1, 1903, and 169,300 acre feet was in storage at the end of September, 1940.

The study and this exhibit, which concludes it, disclose that for 37 years the water supply of the North Platte River, assuming the use of the presently constructed reservoirs, Pathfinder, Seminoe and Alcova, was sufficient for the following purposes:

1. For all present uses and the irrigation of presently irrigated lands in Colorado, and upon all tributaries and from the main stream in Wyoming above Whalen.

2. To supply the Whalen-Tri-State Dam section with a requirement of not less than the Master's determined demand of 1,027,000 acre feet during the May-September period.

3. For the irrigation of the Kendrick Project.

It must be understood, of course, that the equivalent demand imposed upon the stream by the study was additional depletion above Pathfinder of 68,500 acre feet, winter release at Pathfinder of 10,000 acre feet, and May-September requirement of the Whalen-Tri-State Dam section of 950,000 acre feet, or a total of 1,028,500 acre feet. The recommendations of the Master have eliminated the additional deplection above Pathfinder and the winter release, so that this amount of water may be added to the assumed May-September requirement of 950,000 acre feet for the Whalen-Tri-State Dam section.

The Wyoming study, comprised in exhibits 170 to 176, is referred to at page 65 of the Master's Report and immediately following is a discussion of the United States study, comprised in United States exhibits 267 to 273 inclusive. In connection with these studies the Master said:

> "With respect to both the Wyoming and United States studies it might be observed that they represent operations on paper which permit a degree of perfection not achieved in practical administration. They presuppose a completely controlled distribution, so that every appropriation, when water is available,

will receive its proper requirement, no more, no less. Nevertheless they do point to the conclusion that under a long-term operation involving use of the Seminoe and Alcova Reservoirs as well as the Pathfinder and the pooling of natural flow and storage water, accompanied by strict regulation of distribution, the needs of the Kendrick Project and of the Whalen-Tri-State Dam section could have been reasonably supplied up to and including most of the year 1940. The same would be true of any similar hypothical operation commenced long enough prior to 1930 to permit accumulation of storage water to the capacity of the reservoirs before the onset of the dry cycle." (M. R. pp. 66-67).

The conclusion is incorrect as to the inference of shortage in 1940. No shortage was disclosed under the Wyoming study. Under the United States study shortage was shown in 1940. However, the Whalen-Tri-State Dam requirement set up by the United States, exceeded that proposed by the Master by approximately 59,000 acre feet. The total requirement was comprised of 723,000 acre feet for the Interstate and Fort Laramie Canals, (U. S. 267), and 307,700 acre feet for the State Line Canals (U. S. 269) and historical diversions of the Wyoming Private Canals, including the French, amounting to an average of approximately 55,000 acre feet (Record p. 28699). The tables from United States exhibits 267 and 269 showing the requirements, are set forth in the appendix, page 41, and the testimony of Mr. Dibble, witness for the United States, relating to use of historical diversions of the private canals between Whalen and Tri-State is reflected at pages 41 and 42 of the appendix. These diversions for the years 1931 to 1940 inclusive, averaged 55,860 acre feet (M. R. Table IX, p. 77). In addition the requirement of the United States study for the Kendrick Project is 184,400 acre feet instead of 168,000 as determined by the Master (M. R. p. 138). In the appendix, page 41, Column 29 of the U. S. Exhibit 273 is reproduced showing the assumed demand of the Kendrick Project.

The United States study assumes 59,000 acre feet for the Whalen-Tri-State Dam section and 16,400 acre feet

for the Kendrick Project in excess of requirements determined by the Master. The total seasonal excess is more than 75,000 acre feet and for a ten-year period would be more than 750,000 acre feet. Consequently, we think no argument is required to demonstrate that such shortages as were found by the United States study in 1940 would have been eliminated if the requirements proposed by the Master had been used instead of those assumed.

Referring to another study presented by Wyoming, the Master states:

> "The evidence is convincing that given 1895-1939 average conditions of supply, water can be conserved by Seminoe and Alcova reservoirs, without violation of priorities between Pathfinder and Tri-State Dam, sufficient substantially to supply the Kendrick Project and leave a considerable return flow (the time and extent of which can only be roughly estimated) to the river in irrigation season, which would represent net seasonal gain to the river below Alcova." (M. R. p. 143).

In the foregoing quotation reference is made to the period 1895 to 1939, while the Wyoming study, above discussed, comprised in Wyoming exhibits 170 to 176, covers in detail only the period 1904 to 1940. However, run-off at Pathfinder, as determined by engineering studies, was such in the preceding years, 1895 to 1903 inclusive, that full requirements of all demands could have been supplied during that period, and this is the testimony of Mr. Nelson, the Wyoming witness, at page 27,581 of the Record, appendix page 26. That such a conclusion is correct is easily demonstrable by a glance at the run-off at Pathfinder for the years 1895 to 1903 which, according to Wyoming exhibit 100, and other exhibits in the record, was as follows:

Year	Acre Feet
1895	1,200,000
1896	1,120,000
1897	1,820,000
1898	1,040,000
1899	2,400,000

Year	Acre Feet
1900	960,000
1901	1,350,000
1902	960,000
1903	1,230,000

The average run-off of these years was 1,342,000 acre feet, as compared with 1,315,910 acre feet for the 1904-1940 period (M. R. p. 24).

As above pointed out, the Wyoming study, comprised in Wyoming exhibits 170 to 176 inclusive, was the only one presented covering the period 1904 to 1940 inclusive, using actual run-off as it occurred for the entire period, assuming the operation of presently existing reservoirs, Pathfinder, Seminoe and Alcova, and full development of the Kendrick Project. The accuracy of this study has never been questioned. It has been assailed only because it has been contended that the demand imposed against the stream was insufficient. We have pointed out that this demand, however, is slightly in excess of the amount of water which it is now found by the Master is necessary to supply requirements of the Whalen-Tri-State Dam section, and of course the Kendrick Project demand is the same as that determined by the Master, and the study uses the same return flows of that Project (M. R. p. 138). The United States study, above discussed also demonstrates the ability of the stream to supply the demands determined in the Master's Report when consideration is given to the requirements of the study, in excess of the Master's findings. As above mentioned, it has been found by the Master that these studies, properly analyzed, demonstrate the ability of the stream to meet the demands upon it and the Master makes the strong statement that under conditions of supply, such as existed 1895-1939, the evidence is "convincing" that water is available to supply the Kendrick Project, without violation of the rights of other appropriators, and with a considerable Kendrick return flow in addition.

Our conclusion has been stated that the water supply as it occurred 1895 to 1940 was adequate to meet all demands, including the Kendrick Project. In addition, the Wyoming stuy discloses that the reservoirs would have spilled in 21 of the 37 years, and such spills are shown in Column 6 of Wyo-

ming exhibit 176, appendix pages 2 to 20. For convenience, we set forth in the following table the amounts of these spills for the respective years.

Year	Acre Feet	Year	Acre Feet
1904	0	1923	251,900
1905	0	1924	728,600
1906	0	1925	0
1907	80,000	1926	596,500
1908	331,200	1927	374,100
1909	1,056,600	1928	735,900
1910	332,500	1929	780,800
1911	0	1930	206,000
1912	124,600	1931	0
1913	438,300	1932	0
1914	230,600	1933	96,100
1915	0	1934	0
1916	0	1935	0
1917	1,099,200	1936	0
1918	737,500	1937	0
1919	119,900	1938	0
1920	446,900	1939	0
1921	707,800	1940	0
1922	246,000		

Total for the 37 years was 9,721,000 acre feet, or an annual average of 262,500 acre feet. This is water in excess of that required to meet all demands and which could not have been utilized because of inability of the three reservoirs to retain it. In any similar period of run-off in the future this supply would be available for additional development above Whalen, Wyoming.

The Water-Supply of 1931 to 1940

From statements at pages 68, 117 and 139 of the Master's Report, some doubt may appear as to the sufficency of supply in the drouth decade, 1931 to 1940, to meet the proposed Whalen-Tri-State Dam section requirement of 1,027,000 acre feet. However, it is abundantly clear from Table III, at page 67 of his report, that the supply, if properly utilized would have been adequate for all the demands upon . . . In this

table the Whalen-Tri-State Dam requirement of 1,027,000 acre feet is measured against the total supply which was actually present each year during the May-September period in the Whalen-Tri-State Dam section, and the last column to the right compares requirement with supply and indicates excesses and deficiencies. The ability of supply to meet demands can be illustrated by an analysis in the form of a tabulation as follows:

		Acre Feet	Acre Feet	Acre Feet
Excesses:	1931	113,300		
	1932	352,500		
	1933	465,100		
Total		930,900	930,900	
Deduct deficiency for 1934			515,400	
Remaining excess after supplying 1934 deficiency			415,500	
Deduct deficiency for 1935			157,000	
Remaining excess after 1935			258,500	258,500
Add excesses (1936-1939)	1936	5,480		
	1937	225,350		
	1938	143,150		
	1939	66,050		
Total		440,030		440,030
Total excess up to 1940				698,530
Deduct 1940 deficiency				382,080
Remaining excess				316,450

The remaining excess of 316,450 acre feet is the ten year total of the average annual excess of 31,645 acre feet shown in the right-hand column of Table III at page 67 of the report. Without utilization of Seminoe and Alcova reservoirs, which were not completed until 1938 and 1939, Pathfinder, with its capacity of 1,045,000 acre feet, would have been adequate to conserve the excesses of 1931, 1932 and 1933. From the comparison of supply and requirement, shown in the Master's Table III, page 67, it is obvious that the supply of the ten year period, with utilization of Pathfinder Reservoir alone, was adequate for the Whalen-Tri-State Dam section, and if it had been used in accordance with the requirements specified there would have been no shortage in any year. What actually happened was that excessive uses in 1931 to 1933 inclusive and 1936 to 1939 inclusive resulted in shortages in 1934, 1935 and 1940. What occurred in this ten year period is conclusive demonstration of the wisdom of limiting use in the Whalen-Tri-State Dam section to actual requirements. Obviously, the irrigators would have been better served if the ten year supply had been so spread throughout the period that the needs of each season would have been met without shortage. It is a convincing demonstration that our proposal for limitation upon Nebraska and Wyoming as to uses made in this section of the stream is necessary.

While we have presented the foregoing analysis, it must not be overlooked that in any future decade, if one occurs similar to 1931 to 1940, preceded by years of plentiful supply such as 1921 to 1930, an additional May-September supply of 46,000 acre feet will be available in the Whalen-Tri-State Dam section by virtue of return flows from the Kendrick Project. Had this project, with its Seminoe and Alcova Reservoirs, been in operation throughout 1921 to 1940, or even from 1926 to 1940, all reservoirs would have been full, and would have spilled in June 1933, as disclosed by the Wyoming study (Wyoming Exhibit 176, Sheet 16), and the United States study (U. S. Exhibit 273). Therefore, in any similar future period, such as 1921 to 1940 or 1926 to 1940, with the Kendrick Project operating, Seminoe and Alcova Reservoirs would be full in such a year as 1933, and since they are capable of supplying the Project for seven years,

as hereinabove pointed out, a complete supply would be available for the Kendrick during any following seven year period, such as 1934 to 1940 inclusive. This would result in an additional Kendrick return flow supply of 46,000 acre feet in the May-September months for use in the Whalen-Tri-State Dam section.

Two fallacies are readily apparent in basing recommendations for decree upon the 1931-1940 conditions of supply:

First: The use of Seminoe and Alcova Reservoirs and irrigation of the Kendrick Project in any future similar period are not taken into account.

Second: The large supplies of preceding years are left out of consideration, and they must be taken into account because of the carry-over capacity of the storage reservoirs from year to year.

Basing recommendations for decree primarily upon the 1931 to 1940 run-off is just as fallacious as it would be to predicate them upon another ten years production, such as 1921 to 19930. For convenient comparison we tabulate below run-off at Pathfinder for these two decades, values taken from pages 23 to 24 of the Master's report:

Year	Acre Feet	Year	Acre Feet
1931	706,300	1921	1,782,000
1932	1,506,600	1922	1,148,200
1933	1,149,500	1923	1,500,800
1934	382,200	1924	1,489,900
1935	696,200	1925	1,244,700
1936	1,045,600	1926	1,776,500
1937	1,130,600	1927	1,456,200
1938	1,334,900	1928	1,725,400
1939	698,200	1929	1,902,700
1940	569,800	1930	1,072,800
Average:	922,000		1,509,920

A proper approach to the problem is such as we have set forth above, based upon consideration of the supply from 1895 to 1940, and taking into account how it can be utilized in the future by operation of the additional reservoirs, Seminoe and Alcova, and the irrigation of the Kendrick Project.

A particular segment of historical data should not form the basis of conclusions, but all historical information should be taken into consideration should be taken into account. We agree with witness Patterson, of Colorado, who testified:

> "But I believe what has happened in the past during periods of observation by man and measurement is the best guide to forecast what probably will happen in the future under the general rule that the history of natural phenomena repeats itself." (Record, p. 22926).

2. MASS ALLOCATION

This is a suit between states and not between individuals. Only the relative rights of the states can be adjudicated. The United States is a party but, on Wyoming's motion to dismiss the case, this Court held that the Secretary of the Interior would be bound by the adjudication as to Wyoming's rights, and the United States occupies a similar position, (M. R. p. 176).

In Wyoming v. Colorado, 259 U. S. 419, a decree was entered June 5, 1922 (259 U. S. 496) and amended October 9, 1922 (260 U. S. 1). Wyoming sued to enforce the decree, decisions appearing in Wyoming v. Colorado, 286 U. S. 494 and 298 U. S. 573. A later suit for enforcement was brought, Wyoming v. Colorado, 309 U. S. 572. As to the nature of the original case we quote the following from the opinion in 286 U. S. 494, pages 508 and 509:

> "But it is said that water claims other than the tunnel appropriation could not be, and were not, affected by the decree, because the claimants were not parties to the suit or represented therein. In this the nature of the suit is misconceived. It was one between states, each acting as a quasi-sovereign and representative of the interests and rights of her people in a controversy with the other. Counsel for Colorado insisted in their brief in that suit that the controversy was 'not between private parties' but 'between the two sovereignties of Wyoming and Colorado'; and this Court in its opinion assented to that view but observed that the controversy was one of imme-

diate and deep concern to both States and that the interests of each were indissolubly linked with those of her appropriators. 259 U. S. 468, 66 L. Ed. 1015, 42 S. Ct. 552. Decisions in other cases also warrant the conclusion that the water claimants in Colorado, and those in Wyoming, were represented by their respective States and are bound by the decree."

The decree, as amended, restricts Colorado to the diversion of 39,750 acre feet annually, as is fully explained in the opinion in 309 U. S. 572 at pages 576 and 577. This total was based upon findings that 18,000 acre feet should be allowed for the Skyline ditch, 4,250 acre feet for the meadowland appropriators, 15,500 acre feet for the tunnel appropriations and 2,000 for the Wilson supply ditch. A proper construction of this decree, as approved by this Court is set forth in 309 U. S. 572 as follows:

"In support of the contention that the diversion of more than 4250 acre feet for the meadow-land appropriations should not be regarded as a violation of our decree, if the aggregate diversions in Colorado do not exceed the total allowed, Colorado presents a declaratory judgment of the District Court of that State for the County of Laramie, entered February 2, 1939, in the suit of Benziger v. Water Supply & Storage Co. That suit was brought on behalf of the meadowland appropriators in Colorado, and the defendants were the other appropriators in that State whose respective appropriations had been the subject of consideration in the suit in this Court. Our rulings were examined by the state court which concluded that they were intended to, and did, determine only the relative rights of the two States to divert the waters of the Laramie river and its tributaries, and that it was not our purpose to withdraw the appropriations and water claims in Colorado from the operation of its local laws or to restrict the utilization of the waters in any way 'not affecting the rights of the State of Wyoming and her water claimants.' Accordingly the state court held that the fixing in our decree of the meadowland appropriations was intended only to

bear upon the relative rights of the States and was not intended to be an adjudication of the relative rights of the decreed appropriations in Colorado; hence, that so long as the aggregate of the water diverted in Colorado does not exceed the total of 39,750 acre feet accredited to the Colorado appropriations, as stated, they are subject to the laws of Colorado. In that view the Court adjudged that the meadowland appropriators and the defenant appropriators were entitled to divert according to their respective priorities until they reached the amount of 39,750 acre feet, and that when that amount had been diverted 'all headgates are to be closed for the balance of the season.' A review of our decisions confirms the construction thus placed upon them." (pp. 575, 576).

Colorado exhibit 170 is a copy of the judgment referred to in the above quotation entered February 2, 1939 in the suit of Benzinger v. Water Supply & Storage Company.

From the different decisions in Wyoming v. Colorado, above referred to, and particularly the later ones involving enforcement of the decree, it is clear, beyond question, that a mass allocation of supply was made without allotment to any individual appropriator or project in the state of Colorado. The balance of the supply, after the permitted Colorado diversion of 39,750 acre feet, was allotted to Wyoming.

The principles of Wyoming v. Colorado in this respect are recognized in the following portion of the Master's Report:

"Wyoming feels that such a limitation should be placed on the Nebraska State Line Canals for its effect upon the conservation of storage water. From a practical standpoint, and perhaps from an equitable standpoint, this might be a proper and desirable measure. From a legal standpoint, I doubt the jurisdiction of this Court to fix such limitations upon individual canals. The suit is between States and jurisdiction is invoked to determine the equitable rights of the States, that is, to determine the proper apportionment of water between them. The requirements of individual appropriators

> in each State being one of the elements in the ascertainment of the State's equitable share, they are incidentally a proper matter for investigation and determination for their bearing on the ultimate issue. But it would be quite a different matter to undertake to define the rights of indivdual appropriators between each other or between them and their State, or to determine what portion of the State's share must be allocated to any appropriator or group of appropriators, or to place a limit upon the participation of any appropriator or group in such allocation. That, in the absence of the appropriators as parties, would, I apprehend, as to them amount to a denial of due process of law. Consequently, the findings herein as to requirements cannot, I think, be deemed a limitation upon individual canals or groups, in actual administration, either as to natural flow or storage water, nor do I think any such limitation can properly be imposed by the decree." (M. R. pp. 160, 161).

The above quotation is in error in its statement that this Defendant feels that a limitation should be placed upon the Nebraska State Line Canals, if it is meant thereby that any restriction as to individual canals is proposed. What Wyoming does propose in that connection, is a limitation upon the State of Nebraska. While the Master recognized the correct principles applicable, as disclosed by the above quotation, they are violated in his recommendations for decree, particularly with reference to paragraphs numbered 3 and 4, pages 177 and 178 of his report wherein requirements are fixed for individual canals, and a type of administration is proposed as between these canals, the reservoirs of the North Platte and Kendrick Projects, and the natural flow rights of the Kendrick. The irrigation districts mentioned therein supplying State Line Canals, such as the Mitchell, Gering, Farmers and Ramshorn, are not parties to this suit. Neither is any appropriator or user of water under any one of them a party. The Casper-Alcova Irrigation District is the operating agency of the Kendrick Project (W-3), and it is not a party to this suit. Consistent with the principles announced by the Master in the quotation above set forth

from his Report, the individual rights of any one of the districts mentioned can not be adjudicated or determined in this cause. Certainly, it requires no argument that an individual or corporation, who is not a party, may not have his or its rights determined. As pointed out by the Master, the requirements of individual appropriators must be considered as one of the elements in ascertaining the equitable share of each State, but that is the sole purpose of dealing with them. An allocation, apportionment or division of supply must be made between the respective states, leaving each state jurisdiction over the use of the supply allotted to it. This has been clearly demonstrated in Wyoming v. Colorado, supra. It is likewise in accord with the principles announced by this Court in Kansas v. Colorado, 206 U.S. 46, 51 L. Ed. 956, where numerous authorities are cited in support of the following proposition:

> "It is enough for the purposes of this case that each State has full jurisdiction over the lands within its borders, including the beds of streams and other waters." (p. 93).

In another class of cases it has been determined that the rights of individual appropriators cannot be adjudicated in a suit to which they are not parties. We refer to such cases as Humboldt Land & Cattle Company v. Allen, 14 Fed. (2d) 650, 274 U. S. 711, and Mitchell Irrigation District v. Whiting, 136 Pac. (2d) 502, certiorari denied by this Court April 24, 1944.

As pointed out by the Master, in the excerpt from his report above quoted, the determination of the rights of the individual appropriators who are not parties would amount to a denial of due process of law.

Our position is that any decree entered in this case should conform to the findings and conclusions of the Master above set forth, and can not be such as will define the relative rights of individual canals, projects, irrigation districts or groups of canals, or the relationship between them, or between such individual canals, projects, irrigation districts or groups of canals and the storage reservoirs. Specifically, we submit that such provisions as are contained in paragraphs 3 and 4 of the Master's recommendations for decree are vio-

lative of the Master's findings and conclusions and of the principles announced by this Court in Wyoming v. Colorado, supra.

At page 141 of his report the Master admits that it may be suggested that the proposed regulation, with reference to the Kendrick Project, is inconsistent with the view expressed, that the decree may not deal with the rights of individual appropriators or parties. We do make such suggestion and emphatically urge it upon the Court. We do not find any justification for the action of the Master in making such a recommendation as he has with reference to the Kendrick Project, for the reasons set out at page 141 of his report wherein he states that the legal owner of the storage appropriation is the United States and that storage facilities are operated by the United States, and that consequently some regulation may be proposed not otherwise applicable. As found by the Master, in this respect, the United States occupies the same position as any other appropriator, and this was determined by this Court in ruling on Wyoming's motion to dismiss, (295 U. S. 40). It is also stated at page 141 of the Master's Report, that Wyoming has not objected to regulation of natural flow diversions supplying the Kendrick Project upon jurisdictional grounds.

The statement is in error as this Defendant has never proposed any solution of the case which would purport to fix or determine the rights of the Kendrick Project, or the Casper canal, except as one of the elements in a determination of equitable apportionment between Wyoming and Nebraska.

The report of the Master makes a type of mass allocation, as to all sections of the stream except the Whalen-Tri-State Dam section and the Kendrick Project. The restrictions to present uses in Colorado and upon tributaries in Wyoming and from the main stream above Whalen, exclusive of the Kendrick Project, are an acceptable form of mass allocation. We perceive no reason for departing from established principles as to the Whalen-Tri-State Dam section and the Kendrick Project.

The Master has determined that 46,000 acre feet may be diverted at Whalen to the inland reservoirs of the Pathfinder

Irrigation District, Lakes Alice and Minatare, during the winter months (M. R. pp. 60, 61). This, too, is an acceptable form of mass allocation. As to the Whalen-Tri-State Dam section, the Master has determined a requirement of 1,027,000 acre feet to be necessary in the May-September period (M. R. pp. 60, 61). This can readily be divided between Wyoming and Nebraska on the basis of the tables appearing at pages 59 and 86 of the Master's Report. Inadvertently an error was made in the report in computation of the Wyoming requirement, same appearing at page 163 as 227,000 acre feet. Quantities shown for Wyoming land in Table II, page 59, are as follows:

Goshen Irrigation District	137,500 acre feet
Wright and Murphy Lands	577 acre feet
Lingle and Hill Districts	46,000 acre feet
Nine Wyoming Private Canals (Including French lands in Wyoming)	43,000 acre feet
Total	227,077 acre feet

This, no doubt, is the derivation of value at page 163, but there is omitted the Wyoming lands in the Pathfinder Irrigation District comprising 2,300 acres with a requirement of 9,844 acre feet, as shown in Table XVII, page 86 of the report. Adding this requirement to that above shown, makes a total of 236,921 for which, a round value figure of 237,000 may be used, leaving 790,000 acre feet for Nebraska use, or total sectional requirements of 1,027,000. The actual Nebraska total, according to the tabulation on page 59 of the Master's Report, is something less than 790,000, but for practical purposes the total requirement of 1,027,000 should be divided—237,000 to Wyoming and 790,000 to Nebraska.

The diversion requirement of the Kendrick Project is 168,000 acre feet (M. R. p. 138). A mass allocation of these May-September requirements should be made, resulting in an allocation of 790,000 acre feet to Nebraska and 237,000 plus 168,000, or 405,000 to Wyoming.

We have pointed out in the preceding discussion relating to water supply, that during the period 1895 to 1940 inclusive, lands presently irrigated in Colorado, and lands presently

irrigated in Wyoming upon all tributaries, and from the main stream above Whalen, could have been supplied and the requirement of the Whalen-Tri-State Dam section as proposed by the Master, and also the Kendrick Project. Since the Master has restricted development in Colorado and from the tributaries in Wyoming, and from the main stream above Whalen, exclusive of the Kendrick Project, to present uses, the supply for the Whalen-Tri-State Dam section and the Kendrick Project will not be diminished.

Therefore, under the principles announced by this Court in Wyoming v. Colorado, the available and dependable supply being adequate for such uses, and this being a suit between states in which only the relative rights of the states can be adjudicated, and not the individual rights of any appropriator, irrigation district, project or canal, no one of whom is a party to this suit, a correct solution of the case, as to the Whalen-Tri-State Dam section and the Kendrick Project, is the mass allocation we have indicated above.

In this connection Wyoming does not propose any restriction for Nebraska to which she is not willing to submit herself. If the water supply of the North Platte River is to be beneficially utilized, wthout needless waste of this valuable resource, uses must be limited to actual requirements, and the same limitations must be imposed upon Nebraska as are suggested for either Colorado or Wyoming. It is said by the Master (M. R. p. 66) that by strict regulation of distribution and the pooling of natural flow and storage water, the needs of the Kendrick Project and of the Whalen-Tri-State Dam section could have been reasonably supplied up to and including most of the year 1940, and we have endeavored to point out that by a proper interpretation of the water supply studies presented by Wyoming and the United States there would have been no shortage at any time from 1895 to 1940. There can be no reason for failing to apply strict regulation of distribution in the Whalen-Tri-State Dam section. Such strict regulation should be applied to both Wyoming and Nebraska and can be accomplished by limiting each State to actual requirements, and Wyoming should likewise be limited to the actual needs of the Kendrick Project. Only if this is done will reservoir supplies be conserved from years of large run-off to succeeding ones of more

meager production, and only so can the actual purposes of the existing reservoir construction be served.

Heretofore we have throughout used the requirement determined by the Master for the Whalen-Tri-State Dam section of 1,027,000 acre feet, as we have endeavored to measure such a demand against the available supply, and also outline to the Court what we believe the decision should be based upon the factual findings which were made. In a succeeding section of this Brief we shall point out that we believe the requirement for use by Nebraska should be reduced 85,000 acre feet, leaving it 705,000 acre feet instead of 790,000 acre feet.

An additional consideration making mass allocation imperative is that principles applied in cases between individuals are not applcable in suits between states. (See Master's Report, pages 106 and 107). In Connecticut v. Massachusetts, 282, U. S. 550, this Court said:

> "For the decision of suits between States, federal, state and international law is considered and applied by this court as the exigencies of the particular case may require. The determination of the relative rights of contending states in respect of the use of streams flowing through them does not depend upon the same considerations and is not governed by the same rules of law that are applied in such States for the solution of similar questions of private right. Kansas v. Colorado, 185 U. S. 125, 146, 46 L. Ed. 838, 846, 22 S. Ct. 552. And, while the municipal law relating to like questions between individuals is to be taken into account, it is not to be deemed to have controlling weight. As was shown in Kansas v. Colorado, 206 U. S. 46, 100, 51 L. Ed. 956, 975, 27 S. Ct. 655, such disputes are to be settled on the basis of equality of right. But this is not to say that there must be an equal division of the waters of an interstate stream among the states through which it flows. It means that the principles of right and equity shall be applied having regard to the 'equal level or plane on which all States stand in point of power and right under our constitutional system,' and that, upon a

consideration of the pertinent laws of the contending States and all other relevant facts, this court will determine what is an equitable apportionment of the use of such waters. Wyoming v. Colorado, 259, U. S. 419, 465, 470, 66 L. Ed. 999, 1013, 1015, 42 S. Ct. 552.

"The development of what Mr. Justice Brewer, speaking for the Court in Kansas v. Colorado, 206 U. S. 46, 98, 51 L. Ed. 956, 975, 27 S. Ct. 655, refers to as interstate common law, is indicated and its application for the ascertainment of the relative rights of States in respect of interstate waters is illustrated by Missouri v. Illinois, 200 U. S. 496, 50 L. Ed. 572, 26 S. Ct. 268; Kansas v. Colorado, supra; Wyoming v. Colorado, 259 U. S. 419, 465, 470, 470, 66 L. Ed. 999, 1013, 1015, 42 St. Ct. 552, supra, and Wisconsin v. Illinois, 278 U. S. 367, 73 L. Ed. 426, 49 S. Ct. 163, 281, U. S. 179, 74 L. Ed. 799, 50 S. Ct. 266. Two of these cases are much like the one at bar." (pp. 670, 671).

How can the rights of individual appropriators, or irrigation districts be determined on the basis of "interstate common law"? Conversely, how may the States obtain just recognition of their respective rights upon the basis of applying municipal law relating to like questions between individuals? An appropriate decision between states can be reached only by the applicaton of the principles enunciated by this Court in Connecticut v. Massachusetts, supra, and the cases therein cited. No proper disposition can be made by application of principles governing adjudication of rights between individuals. It is a suit between states which should be governed by the established rules of this Court which heretofore have been applied in such controversies, and a correct solution can not be reached by determination of any portion of the controversy on the basis of adjudication between individuals.

3. SEGREGATION OF NATURAL FLOW AND STORAGE

Seminoe, Pathfinder and Alcova Reservoirs are respectively 240, 210 and 197 miles up-stream from Whalen, and 283, 253 and 240 miles respectively up-stream from Tri-State Dam. Guernsey Reservoir is about eight miles above Whalen. Water supplied at or below Whalen, and originating above Seminoe,

must pass through all four reservoirs, as all are in the channel of the stream. During the irrigation season, May to September inclusive, there are accretions to the stream between Alcova and Whalen comprising run-off of tributaries, and there are return flow accretions between Whalen and Tri-State Dam. The Laramie River enters the stream below Whalen. As shown by Wyoming Exhibit 173, (Appendix p. 40) average May-September accretion between Pathfinder (Alcova) and Whalen was 141,000 acre feet for the 1904-1940 period. Usable accretions between Whalen and Tri-State Dam as they occurred in the 1931-1940 decade, are shown in Table III, page 67, of the Master's Report; as is also inflow of the Laramie River. The natural flow of the stream, or that portion of supply which is not storage water, in the Whalen-Tri-State Dam section, is comprised of natural flow which is released through the upper reservoirs at Alcova; the accretions between Alcova and Whalen; the inflow of the Laramie River, and the other accretions between Whalen and the Wyoming-Nebraska State line or Tri-State Dam. In the average May-September period the total accretions below Alcova amount to between 230,000 and 250,000 acre feet.

The distances involved, the regulation provided by four reservoir, and the different sources of the natural flow supply make it impossible to determine what is natural flow and what is storage water in the Whalen-Tri-State Dam section from day to day. Such impossibility is recognized in the Master's Report as follows:

> "There has been no engineering analysis directed to the question of what might be a proper mass allocation of natural flow segregated from storage. In fact the evidence as to what is the natural flow fund in the section is not definite and complete." (M.R. pp. 162, 163.)
>
> "Mass allocation for the section of natural flow only would encounter difficulty arising from a lack of complete evidence as to the volume of natural flow in the section available for distribution when segregated from storage water." (M.R. p. 150.)

Notwithstanding the findings and conclusions that natural flow and storage cannot be segregated in the Whalen-Tri-State Dam section, and that a mass allocation of natural flow only would encounter difficulty because of lack of evidence as to the volume of natural flow, paragraph 6 of the recommendations

for decree, page 179 of the Master's Report, recommends a type of mass allocation of natural flow, with 25 per cent to Wyoming and 75 per cent to Nebraska, and it is further recommended that segregation should be based upon the formula of U.S. Exhibit 204-A. The recommendation is directly contrary to the findings.

The findings are well supported by the evidence in the cause. U.S. Exhibit 204-A was presented through the witness for the United States, C. F. Gleason. He is the Manager of the North Platte Project and had been for more than eleven years at the time of his testimony (Record, p. 28021, Appendix p. 60). He has been employed by the Bureau of Reclamation since 1907 (Record pp. 27979, 27980, Appendix pp. 42-43). No one is better qualified to testify upon the question of segregation of natural flow and storage because he speaks from actual experience. He is the only witness who testified concerning U.S. Exhibit 204-A, and his testimony appears at pages 27979 to 28056 of the Record. In the Appendix, pages 42 to 66 we have set forth so much of the testimony of this witness as appears necessary to show the situation concerning segregation under the formula of U.S. Exhibit 204-A, consisting of the direct examination, pages 27979 to 27988, the Nebraska cross-examination at pages 27989 to 28008, and the Wyoming cross-examination at pages 28021 to 28029. U.S. Exhibit 204-A appears at pages 66 to 68 of the Appendix.

The exhibit, U.S. 204-A, comprises six sheets, and sheets 3 and 4 contain the formula variously referred to as that of U.S. Exhibit 204-A or that of May 1940. The testimony of Mr. Gleason discloses that in order to segregate storage and natural flow, loss by evaporation below Alcova must be determined. To make such a determination it is necessary to apply an evaporation rate, such as is set forth in U.S. Exhibit 204-A, sheet 3, where daily evaporation losses appear for three sections of the stream, comprising the entire distance from Alcova to the Wyoming-Nebraska State line. These are daily loss values and to make a determination of the loss occurring between Alcova and the Wyoming-Nebraska State line, it is necessary to estimate or determine the number of days required for the water to travel from one point to the other. However, the formula, as contained in sheets 3 and 4 of the exhibit, does not contain any data whatsoever as to the time interval.

The time required for water to travel from Alcova to the Wyoming-Nebraska State line cannot be accurately specified in

advance since it varies under different conditions. Nebraska's Water Administrator, Mr. Willis, concerning this time interval, testified as follows:

> "Q.—How long do you thing, Mr. Willis, that it takes water to come from the Pathfinder Reservoir to the State line?
>
> A.—To the State line it takes about four or four and a half days." (Record p. 568)

On the subject of this time interval, Mr. Gleason testified that it varies with the amount of water flowing in the river and and with changes in the flow that are made, and that it is a very problematical factor to attempt to make a formula to fit and that he, the witness, had not been able to make one. (Record p. 27996, Appendix p. 52). He further stated that a thousand second feet at Alcova begins to reach Guernsey in two days, but not completely for four days, and that this was the reason that the ordinary three day interval, which was used in connection with U.S. Exhibit 204-A, did not fit (Record p. 27997, Appendix p. 53).

Since U.S. Exhibit 204-A does not cover the question of the time interval, it is incomplete. According to Mr. Gleason, who is the only witness on the subject, it never was and is not a complete formula. (Record p. 27999, Appendix p. 54.) If a straight three day time interval is applied, very erratic results occur and one day the natural flow may come out exactly right at the state line, and be off a thousand second feet the next day (Record 28000, Appendix p. 55). The formula was abandoned in 1941 because the natural flow users might have been heavily penalized by its use (Record p. 28008, Appendix pp. 59-60). No rigid formula has been found that will fit and the operation of the Kendrick Project will very likely add additional complications (Record p. 28029, Appendix p. 65). Three experimental schedules have been used since March 1940 (Record p. 28005, Appendix p. 58).

Since there is no testimony on this subject except that of Mr. Gleason, it is undisputed that this formula, recommended by the Master, is one which does not contain all of the necessary elements, and cannot be used at all except by the arbitrary application of a time interval. If this recommendation of the Master is permitted to stand, who shall determine what this time

interval is to be. An arbitrary three day time interval was used unsuccessfully. There is no intimation that any other constant value will fit the situation. The testimony of Mr. Gleason leaves very little hope for the working out of any accurate formula. After ten years of effort no formula has been found that will fit (Record p. 28029, Appendix p. 65).

There is no basis for the adoption of any plan requiring segregation of natural flow and storage. No satisfactory reason is advanced in the Master's Report for making such an attempted segregation. Whatever the reason might be, there is none which can justify the use of a formula or the making of an attempted segregation which will result in such injurious consequences to the litigant states. Unquestionably U.S. Exhibit 204-A expresses as accurate a means as has been determined, but thereunder an error of one thousand second feet per day may occur. The rate of delivery to the lands in this section of the stream is one second foot for each seventy acres (M.R. p. 15), and one thousand second feet is a supply for 70,000 acres. Canals having natural flow rights only in Wyoming in the Whalen-Tri-State Dam section comprise 15,359 acres and in Nebraska 15,652 acres (See Table VI, page 74 M.R.). On any day on which there might be an error of only as much as 225 second feet, the Nebraska lands might be deprived of water, and a somewhat smaller error would deprive the Wyoming lands of water. An error of less than 450 second feet would deprive the lands in Wyoming and Nebraska having only natural flow rights from obtaining any supply.

At page 69 of the Master's Report it is stated that the formula of U.S. Exhibit 204-A is currently in use. This appears to be an unwarranted conclusion since the testimony discloses that between May 1940, when it was first evolved, and December 1941, when Mr. Gleason testified three different formulae were used (Record p. 28005, Appendix p. 58). Testimony in the case was concluded in December 1941, and we know of no later information as to the use of this formula.

The Master's doubts as to the adequacy of this formula are incorporated in his recommendations (M.R. p. 177, paragraph 6) since he says it is to be used only unless and until Nebraska, Wyoming and the United States may agree upon a modification or upon another formula. The testimony of Mr. Gleason very definitely discloses inability to reach any agreement heretofore. It seems obvious that no agreement can be reached because no

one has been able to determine one of the necessary elements, to-wit: the time interval, and Mr. Gleason says that after ten years of labor on the problem he is unable to offer a solution. When he applied an arbitrary three day interval, as above explained, errors of as much as one thousand second feet per day occurred (Record p. 28000, Appendix p. 55), and the formula had to be abandoned because its continued use would have resulted in heavy penalization of direct flow users (Record p. 28008, Appendix pp. 59-60).

Segregation of direct flow and storage in the Whalen-Tri-State Dam section is not necessary in a proper solution of this case, and no matter what the necessity might appear to be, there can be no warrant for the adoption of a formula which is incomplete. Nor can there be any justification for the use of a formula which, by the application of an assumed time interval, will result in errors as of much as one thousand second feet per day. The injustice to the litigant states inherent in so doing is readily apparent, as such unavoidable errors could only have the effect of depriving the irrigators of one state or the other of water to which they should be entitled.

Contracts for the use of water by irrigators under the North Platte Project in the Whalen-Tri-State Dam section have been entered into by the United States with the Pathfinder, Gering-Fort Laramie, Northport and Goshen Irrigation Districts, copies of such contracts being respectively Nebraska Exhibits 570, 567 and 574, and Wyoming Exhibit W-11-A. Warren Act contracts are in effect between the United States and the Farmers Irrigation District, supplying lands under the Tri-State canal; the Gering Irrigation District for lands under the Gering canal, and for lands under the Lingle and Hill Irrigation Districts supplied through the Interstate canal in Wyoming. Nebraska Exhibits 530 and 531 are copies of the Gering and Farmers Irrigation District contracts, and Wyoming Exhibits 20 to 25 inclusive are copies of the Lingle and Hill contracts. In none of these contracts is there any attempt to segregate natural flow and storage supplies, or to set forth what amount of storage or natural flow shall be delivered in relation to each other.

The North Platte Project contracts do not contatin any suggestion of segregation of natural flow and storage supplies. On the contrary the Goshen Irrigation District contract, W-11-A, contains the following:

"The United States will store water for the irrigation of the District lands in the Pathfinder reservoir or elsewhere and the District shall have a perpetual right to the annual combined supply of said stored water together with the natural flow of the North Platte River, as the same may be augmented by precipitation, percolation, seepage, return flow, developed and undeveloped waters, in the quantity annually needed for the irrigation of the District lands, not, however, to exceed the quantity that can be beneficially used thereon, nor to exceed one cubic foot per second for each seventy acres of land; * * *." (W-11-A, par. 4½.)

Similarly it is provided in the Gering-Fort Laramie Irrigation District contract N-567, as follows:

"The United States will store for the District and release from Pathfinder reservoir and elsewhere and will divert at Whalen dam all stored water and all other water to which the lands of the District may be entitled * * *." (N-567, par. 8.)

The Warren Act contracts expressly recognize delivery of a supply coming from different sources without segregation. These contracts, in this respect, are substantially identical and contain provisions similar to Article 1 of the Gering contract, set out at Page 190 of the Master's Report, as follows:

"The United States will impound and store water in the Pathfinder Reservoir, or elsewhere, and release the same into the North Platte River at such times and in sufficient quantities to deliver, and does hereby agree to deliver at the Wyoming-Nebraska State line for the use of said District an amount of water which will, with all the water the lands of the District may be entitled to by reason of any appropriations and all water not otherwise appropriated, including drainage and seepage waters developed by the United States, aggregate a flow of water as follows: (Here follows the delivery schedule); the total amount to be so delivered being approximately 35,500 acre feet."

Wyoming advocates for the Whalen-Tri-State Dam section a mass allocation of total seasonal supply incorporated in an apportionment between Nebraska and Wyoming for that section

and the Kendrick Project. The Master proposes elimination of storage water from apportionment between the states and recommends mass allocation of natural flow only based upon percentages.

We do not take the position that attempted segregation of natural flow and storage water may not serve some useful purpose where day by day determination may not be necessary, or where errors may be unimportant, but we do say that as one of the elements of apportionment between Nebraska and Wyoming such a segregation should not be employed for the following reasons:

1. The formula of U.S. Exhibit 204-A is not complete and no complete formula is available.

2. The use of the formula of U.S. Exhibit 204-A, by the application of a constant time interval, results in very great errors and can only operate in a most inequitable manner, if used as a necessary element of apportionmen between the two states.

4. APPORTIONMENT OF STORAGE WATER

That a determination, day by day, of the respective amounts of natural flow and storage in the Whalen-Tri-State Dam section cannot be made is disclosed by the quotations from the Master's Report hereinabove set forth, which find indisputable support in the evidence. However, some approximation can be made at the end of each season as to the seasonal quantities during the May-September period. At page 71 of the Master's Report appears Table IV showing an analysis of seasonal quantities of natural flow and storage water in the Whalen-Tri-State Dam section for the years 1931 to 1940. In the language of the Master, it is a useful approximation, admittedly subject to a material margin of error (M.R. p. 70). Such an approximation discloses average natural flow supply of the May-September period of 496,267 acre feet, leaving 530,733 acre feet of the requirement of 1,027,000 acre feet to be made up out of storage. Since the average seasonal supply of the 1931-1940 decade exceeded 1,027,000 acre feet (M.R. p. 67), it is obvious that if the approximation has any reasonable approach to accuracy, over one-half of the total supply in the 1931-1940 decade was storage.

What does the Master propose as to apportionment of this storage water, comprising more than half of the supply? He says:

"Recognizing that storage water must be left for distribution in accordance with the contracts relating thereto, a recommendation will be made for an allocation between Wyoming and Nebraska on the basis of certain proportions of the daily natural flow." (M.R. p. 10.)

"The North Platte Project storage water was disposed of under contracts between the United States and the land owners under the project and the Warren Act contract purchasers. The rights of the latter are subordinate to the rights of the project appropriators, and are limited to such water as may be stored in excess of what is necessary to satisfy the project contracts. The obligation and necessity of performance of these contracts must be recognized by the decree. The only water subject to allocation therefore is the natural flow." (M.R. p. 69.)

"A further objection to the proposal advanced by Wyoming is that it apportions not only natural flow but also storage water the disposition of which is controlled by contracts and which is therefore not subject to apportionment." (M.R. p. 150.)

In what way is this Court deprived of jurisdiction to make an equitable apportionment between the litigant states by reason of the fact that water is stored in reservoirs and delivered to irrigators under contracts between the United States and the Irrigation Districts, which represent the water users? Is it possible that the Constitutional powers of this Court may be diminished because of private contract? We think not.

The contracts involved are of two kinds: those relating to units of the North Platte Project, those consummated under authority of the Warren Act. The North Platte Project contracts are those of the Gering-Fort Laramie Irrigation District, under the Fort Laramie canal; the Goshen Irrigation District under the Fort Laramie; the Pathfinder Irrigation District under the Interstate, and the Northport Irrigation District which receives its supply through the Tri-State canal, and copies of these contracts may be found in the record as Nebraska and Wyoming exhibits respectively numbered N-567, W-11 A, N-570 and N-574. These are the contracts between the United States and the respective irrigation districts, which are the corporations representing the appropriators. The North Platte Project was constructed by the Bureau of Reclamation under the Reclamation Act of 1902 (M.R. p. 30).

The other class of contracts comprises those made under the provisions of the Warren Act (36 Stat. Sections 925 and 926, Title 43 U.S.C.A. Sections 523 and 524). Generally speaking this Act provides for the disposal of surplus water stored under the provisions of the Reclamation Law.

It is first to be noted that Section 8 of the Reclamation Act of 1902 (32 Stat. 390, 43 U.S.C.A. 383), provides as follows:

> "Nothing in this chapter shall be construed as affecting or inteded to affect or in any way interfere with the laws of any State or Territory relating to the control, appropriation, use or distribution of water used in irrigation, or any vested right acquired thereunder, and the Secretary of the Interior, in carrying out the provisions of this chapter, shall proceed in conformity with such laws, and nothing herein shall in any way affect any right of any State or of the Federal Government or of any landowner, appropriator, or user of water in, to, or from any interstate stream or the waters thereof."

It is specificially provided that nothing contained in the Reclamation Law shall be construed as affecting or interfering with the laws of any state relating to the control, use or distribution of water used in irrigation. The Secretary must proceed in conformity with state laws. This section of the act was before this Court on the motion to dismiss this cause, opinion appearing in 295 U.S. 40, wherein it is said:

> "The motion asserts that the Secretary of the Interior is an indispensable party. The bill alleges, and we know as matter of law, that the Secretary and his agents, acting by authority of the Reclamation Act and supplementary legislation, must obtain permits and priorities for the use of water from the State of Wyoming in the same manner as a private appropriator or an irrigation district formed under the state law. His rights can rise no higher than those of Wyoming, and an adjudication of the defendant's rights will necessarily bind him. Wyoming will stand in judgment for him as for any other appropriator in that state. He is not a necessary party." (Pages 43,44.)

Relative to the same statutory enactment, we quote from the

opinion of this Court in Ickes v. Fox, 300 U.S. 82, 81 L. Ed. 525, as follows:

> "Although the government diverted, stored and distributed the water, the contention of petitioner that thereby ownership of the water or water-rights became vested in the United States is not well founded. Appropriation was made not for the use of the government, but, under the Reclamation Act, for the use of the landowners; and by the terms of the law and of the contract already referred to, the water rights became the property of the landowners, wholly distinct from the property right of the government in the irrigation works. Compare Murphy v. Kerr (D.C.) 296 F. 536, 544, 545. The government was and remained simply a carrier and distributor of the water (ibid.), with the right to receive the sums stipulated in the contracts as reimbursement for the cost of construction and annual charges for operation and maintenance of the works. As security therefor, it was provided that the government should have a lien upon the lands and the water-rights appurtenant thereto —a provision which in itself imports that the water-rights belong to another than the lienor, that is to say, to the land owner." (300 U.S. pp. 94, 95.)

The Reclamation Law gives no support to any theory that carriage, distribution or use of water stored in reservoirs constructed under the Act, is to be immune from such State control as otherwise is applicable. Nothing is contained in any one of the contracts above mentioned, which in any way purports to remove the contracts or the delivery and use of water thereunder from the operation of state laws. On the contrary paragraph 31 of the contract between the United States and the Pathfinder Irrigation District (N-570) provides as follows:

> "The distribution of stored water from the Pathfinder Reservoir constructed by the United States on the North Platte River after the same is turned out of said reservoir into the river, will be in charge of the proper state officers or other officers charged by law with the distribution of stored water from North Platte River, and with the regulation of headgates for such purposes."

The same provision is found in the contracts between the United States and the Northport Irrigation District, and the

United States and the Goshen Irrigation District (N-574, paragraph 24, W-11 A, paragraph 30).

Contrary to the theory of any claimed immunity from judicial decree, it is expressly provided in the contract between the United States and the Northport Irrigation District (N-574, paragraph 46), as follows:

> "The requirements of this article as to the rates of delivery of water are not to be effective (1) if a different rate of delivery is prescribed by the proper officials of the States of Nebraska or Wyoming, or by order or decree of a competent court, or (2) if unlawful diversions of third parties prevent the delivery herein requested."

An identical provision is contained in the contract of the Goshen Irrigation District (W-11 A, paragraph 50) and in that of the Pathfinder Irrigation District (N-570, paragraph 58). These contracts expressly provide that delivery of water thereunder is subject to judicial decree. In our opinion such provisions merely indicate submission to lawful authority, but are wholly unnecessary, as we know of no means whereby the jurisdiction of this Court may be infringed by private contract.

It is provided in Section 8 of the Reclamation Act, (32 Stat. 390, 43 U.S.C.A. Section 372) as follows:

> "The right to the use of water acquired under the provisions of the reclamation law shall be appurtenant to the land irrigated, and beneficial use shall be the basis, the measure and the limit of the right."

As above explained, the Warren Act (36 Stat. 925, 926, 43 U.S.C.A. Sec. 523, 524) extends the provisions of the Reclamation law, permitting the sale of excess storage conserved in reservoirs constructed by the Bureau of Reclamation. The Warren Act contracts of appropriators from the Whalen-Tri-State Dam section are those of the Farmers Irrigation District served by the Tri-State canal, and of the Gering Irrigation District served by the Gering Canal, and of the Lingle and Hill Districts, comprising lands in Wyoming served by the Interstate canal. N-531 and N-530 are copies of the contracts of the Farmers Irrigation District and the Gering Irrigation District, and W-20 to W-25 are copies of the contracts of the Lingle and Hill Districts. At page 160 of the Master's report, it is said:

> "All of the storage water contracts (Project and Warren Act) limit the total water, natural flow and storage, which the holder of any contract may demand, to that for which his land has beneficial use."

Provisions in the Warren Act contracts are identical with that quoted from Article 5 of the Gering Contract at page 190 of the Master's Report as follows:

> "It is agreed that beneficial use shall be the basis, measure and limit of all right acquired by the District hereunder."

By virtue of the express statutory provision, Section 8 of the Reclamation Act, 43 U.S.C.A. 372, beneficial use is the basis, measure and limit of the right to the use of water stored in Government reservoirs constructed under the Reclamation Act or supplied from other sources under the provisions of that law. Without contractual reference thereto, no argument is necessary to support the conclusion that the law becomes a part of any contract made under its authority. Therefore, limitation to beneficial use is an integral part of the North Platte Project and Warren Act contracts. This, or any other Court having jurisdiction in a proper case, can enforce the provisions of the Reclamation Law. This Defendant does not propose that the contracts may be ignored, as suggested by the Master (M.R. p. 117), but on the contrary advocates their enforcement by restricting the litigant states to such quantities of water as may be necessary for beneficial use. What is proposed is that the Reclamation Law shall be made effective by the proposed limitations. The recommendations of the Master, leaving out of consideration as they do an apportionment of storage supplies, are an evasion of the problem.

The Master, however, assumes storage water will be delivered in accordance with the terms of the contracts, saying, with reference thereto:

> "This apportionment assumes that the distribution of storage water is controlled by the various storage contracts and that such water would be delivered in accordance with the terms of those contracts." (M.R. p. 160).

Such an assumption in the light of the record is wholly unwarranted, as is disclosed by the tables at pages 76 to 79 of the Master's Report. The requirements determined by the Master

are, of course, the amounts of water required for the different canals upon the basis of beneficial use. From the tables above referred to, excesses beyond beneficial use were diverted by North Platte Project and Warren Act contract canals in the 1931-1940 decade as follows:

Table VII—Interstate Canal

Year	Acre Feet	Acre Feet
1931	23,600	
1932	127,600	
1933	90,800	
1937		29,200
1938		25,000

Table VIII—Fort Laramie Canal

1932	28,823	
1933	13,323	

Table XI—Gering Canal

1931	1,946	
1932	7,517	
1933	9,248	

Table XII—Tri-State Canal

1931	62,804	
1932	81,774	
1933	32,747	
1936		50,183
1937		33,533
1939		24,160

Table XIV—Northport Canal

1933	22,816	
1937		8,032
1939		2,830
Total	502,998	172,938

This is not an attempt to ignore deficiences for these canals in other years. Rather does it emphasize the conditions for which a remedy should be supplied. If the excesses had not been diverted as they were, this water could have been retained upstram in storage and used to alleviate the deficiences in other years. Heretofore in this Brief, under the heading "The Water

Supply of 1931 to 1940," we have pointed out that the supply for the Whalen-TriState Dam section of the 1931-1940 period, as disclosed at page 67 of the Master's Report, was adequate if properly distributed, and that the excesses of the years in which they occurred could have been conserved, and if so, would have completely eliminated the deficiencies. As disclosed by Table III, at page 67 of the Master's Report, considerable deficiencies appear for the years 1934 and 1935, but the excess diversions of the North Platte Project and Warren Act contract canals for the immediately preceding years, 1931, 1932 and 1933, as shown above, total over 500,000 acre feet.

It must be understood, of course, that not all of the excess water in the Whalen-Tri-State Dam section in years of excess supplies such as 1931 to 1933 inclusive, and 1936 to 1939 inclusive, as disclosed by Table III, page 67 of the Master's Report, was diverted by the North Platte Project and Warren Act contract canals. Some excess diversions were made by the Wyoming private canals and the Mitchell and Ramshorn canals, (Tables IX, X and XIII, M.R. pp. 77 and 79). These canals do not have North Platte Project or Warren Act contracts. Large amounts of water also passed Tri-State Dam unnecessarily in the 1931-1940 decade. In view of the Master's conclusion that return flows and local supplies are adequate for all uses below Tri-State Dam (M.R. pp. 9, 92 and 96), it is unnecessary to have any water passing that point in the irrigation season. Divertible May-September quantities passing Tri-State Dam averaged 81,700 acre feet each year during the 1931-1940 decade. (M.R. p. 96.)

That we may not be misunderstood, we repeat again that this Defendant does not propose a limitation upon any individual canal, but a mass allocation between Wyoming and Nebraska with each State limited to such seasonal quantities as are necessary to furnish the needed requirements. Only in this way will the contracts be enforced, as well as the Reclamation Law which makes beneficial use the basis, the measure and the limit of the right. This Defendant does not propose any alteration or modification in the terms of these contracts, or that any term or provision thereof shall be ignored. All that is advocated is that the contracts may properly be enforced by a limitation imposed upon the litigant states, restricting each to the use of such supplies only as are necessary to provide the irrigators in the respective states, including those receiving water under the contracts, to such amounts as are necessary for beneficial use.

In Wyoming v. Colorado, 259 U.S. 419, this Court, in making an apportionment upon a mass allocation basis between Wyoming and Colorado, did not eliminate storage water from consideration or apportionment. The apportionment was based upon division of "a supply which is fairly constant and dependable, or is susceptible of being made so by storage and conservation within practicable limits." (259 U.S. 480). A just result can be reached in this case only by including storage water in the Whalen-Tri-State Dam section within the equitable apportionment to be made between Nebraska and Wyoming. Otherwise, over half of the supply is eliminated.

Lack of equitable apportionment between the states has permitted diversions by North Platte Project and Warren Act contract canals in excess of beneficial use, and has resulted in unjust and inequitable division of available supplies between Wyoming and Nebraska in the past, as is disclosed by the diversions shown in the tables at pages 76 to 79 of the Master's Report. In order to develop the point it is necessary to make an analysis showing the portions of the supplies diverted by North Platte Project and Warren Act canals which go to the respective states. Since about half of the Fort Laramie canal supplies are for Wyoming and half for Nebraska, it may be eliminated from a study of this kind as far as the respective rights of the two states are concerned, since it may be assumed that excesses were enjoyed equally by the two states. As to the Interstate Canal, the total requirements for Wyoming use are 46,000 acre feet for the Lingle and Hill Irrigation Districts (M.R. p. 59), and approximately 10,000 acre feet for the lands in Wyoming of the Pathfinder Irrigation District (M.R. p. 86), or a total of 56,000 acre feet. The total annual requirement (including winter diversions) is 465,000 acre feet (M.R. p. 59). In the years 1931 to 1933 inclusive, as disclosed in Table VII, page 76 of the Master's Report, the Interstate Canal diverted an excess of 242,000 acre feet. In those years actual diversions of the Lingle and Hill Irrigation Districts in Wyoming, as disclosed by U.S. Exhibit 266, were 37,755 acre feet in 1931, 46,159 in 1932 and 39,780 in 1933. (For Lingle and Hill diversions, see Appendix, p. 70.) These Districts, for the three year period, did not exceed their requirements. The remaining annual requirement under the Interstate Canal for the Pathfinder Irrigation District is 419,000 acre feet (M.R. p. 59). Of this quantity approximately 10,000 acre feet is for Wyoming lands in the Path-

finder Irrigation District (M.R. p. 86), and the remainder is for Nebraska. Percentage-wise the divisiaon is 2½ per cent for Wyoming and 97½ per cent for Nebraska. Therefore, of the total excess of 242,000 acre feet diverted by the Interstate Canal in the years 1931 to 1933 inclusive, 236,000 acre feet was for the benefit of Nebraska and 6,000 for Wyoming. During the same three years the Gering Canal, supplying only Nebraska lands, diverted an excess of 18,711 acre feet; the Tri-State, serving only Nebraska lands, diverted an excess of 177, 325 acre feet; the Northport, serving only Nebraska lands, a net excess of 7,109 acre feet . All these values are derived from the tables on pages 76 to 79 of the Master's Report. Excesses diverted in the years 1931 to 1933 inclusive by North Platte Project and Warren Act contract canals for use in the respective states may therefore be tabulated as follows:

	Wyoming	Nebraska
Interstate Canal	6,000 acre feet	236,000 acre feet
Gering		18,711 acre feet
Tri-State		177,325 acre feet
Northport		7,109 acre feet
Total	6,000 acre feet	439,145 acre feet

The foregoing analysis relates only to canals having storage contracts and is for the purpose of disclosing to the Court what actually occurred when these canals were permitted to divert such supplies as they desired, without the restraint of seasonal limitations upon the states. The remedy is limitation upon each state of seasonal quantities based upon beneficial use. Storage water must be included in such limitations as it comprises more than half of the supply. The tables in the Master's Report, at pages 76 to 79, showing these excess diversions, clearly point to to the imperative need of the remedy suggested. Particularly is this true when it is observed that such large excesses were diverted by Nebraska and her appropriators. Wyoming does not complain of her failure to obtain more water than was required by her appropriators, but does urge upon the Court such a decree as will prevent the unnecessary diversion of large quantities of water by the Nebraska appropriators, thereby diminishing the carry-over storage in the upper storage reservoirs, and unnecessarily impinging upon the storage supply for the Kendrick Project in Wyoming. It would seem that little argument is need-

ed for the making and enforcement of such a decree in this cause as will prevent a recurrence of what happened historically when there was no judicial restraint upon Nebraska.

5. JOINT OPERATION OF STORAGE RESERVOIRS

The United States proposed joint operation of the reservoirs of the North Platte and Kendrick Projects. (M.R. p. 143.) A plan of reservoir operation is set forth in United States Exhibit 265, copy of which appears in the Appendix at pages 71 to 74. It was introduced at page 28597 of the Record, and explanatory remarks of counsel for the United States pertaining there to, appear at pages 28597 and 28598 of the Record, and at page 74 of the Appendix.

In a water supply study made by Barry Dibble, witness for the United States, concluding exhibit of which is U.S. Exhibit 273, the pooling of reservoir supplies was assumed. Mr. Dibble's testimony with reference thereto appears in part at pages 29083 to 29086 of the Record, and is reproduced in the Appendix at pages 75 to 76. From the testimony of Mr. Dibble, appearing in the Appendix, it is disclosed that he carried through a study under which the reservoirs were operated on a priority basis, and the result was that the North Platte Project was the first to run out of water in 1934 (Record, p. 29084, Appendix p. 75). A supply for the Seminoe upon the same basis of operation was available until 1939 or 1940 (Record p. 29084, Appendix p. 75). This study discloses that the junior project would have supplied water to the senior, and the senior would not have been called upon for the benfit of the junior during the drouth decade, 1931 to 1940. The evidence refutes the suggestion made at page 144 of the Master's Report, that the Seminoe (Kendrick Project) might obtain the benefit of the Pathfinder priority.

The upper storage reservoirs have priority dates as follows: Pathfinder, December 6, 1904; Seminoe, December 1, 1931, and Alcova, April 25, 1936 (M.R. pp. 34 and 138). These three reservoirs are located in close proximity to each other, but the senior, Pathfinder, is located between Seminoe and Alcova; Seminoe occupying the upper location on the stream. Tributary inflows and accretions occur between Seminoe and Pathfinder of substantial quantity, the principal tributary being the Sweetwater River which empties into Pathfinder Reservoir. The same difficulty would be experienced in attempting to determine quanti-

ties of water in the different reservoirs under the respective priorities as exists with relation to determining the natural flow in the area, concerning which Mr. C. F. Gleason, Manager of the North Platte Project, testified as follows:

> "Since we have three reservoirs, each of which in turn we have to compute the inflow to and carry it through, we found that we got rather erratic figures from day to day, so for the last two years we have attempted to measure the flow as nearly as possible into those three reservoirs. We maintained a station on the Medicine Bow River above Seminoe, on the North Platte River above Seminoe, and a station is maintained on the Sweetwater River, which is a tributary of the Pathfinder reservoir. During the storage season we get daily reports of gauge heights on these three rivers, and the method as used this year, and I believe last, was to take the sum of those three streams and add an estimated figure of the other small creeks and their run-off on which we had no continuous record, and that was the method used of determining the natural flow." (Record pp. 28015, 28016.)

As was done by Mr. Dibble in connection with the United States water study, Mr. Nelson in the Wyoming study, reflected by Wyoming Exhibits 170 to 176, and which has heretofore been discussed under the heading "The Water Supply," did not make any distinction between reservoir supplies as to priorities, and treated all water conserved as a common fund. No water supply study or engineering analysis was presented in this case showing what would result if the reservoir supplies were used separately under their different priorities, but as above shown Mr. Dibble did refer to a study he had made along these lines. No satisfactory means of making an accurate determination as to priority of reservoir contents of the upper storage reservoirs has been disclosed. The location of reservoirs upon the stream; accretions to the supply between the same; the disparity in priorities, with the senior reservoir located between the two junior ones, make it apparent that a satisfactory or accurate determination as to the amounts of water in the reservoirs under the different priorities at any one time, is impossible. In any event no means has been suggested whereby such a determination can be made.

It is recommended (M.R. pp. 177, 178, pars. 3 and 4), that Wyoming be enjoined from the storage of water in any one of the upper storage reservoirs and also in the Guernsey, otherwise than in accordance with the rule of priority in relation to the appropriations for the Nebraska lands of the State Line canals, and that Wyoming be enjoined from the operation of these reservoirs other than in accordance with the rule of priorities in relation to each other. These recommendations are objectionable for the reasons pointed out in our discussion of mass allocation, since they purport to fix the rights of individual projects and canals, and are not confined to the making of an apportionment between States. We agree fully with the conclusions of the Master at page 115 of his Report, as follows:

> "An interstate priority schedule would necessarily interfere with the freedom of each State in the intrastate administration of the State's share of the water. It would have the effect of fixing the rights of appropriators within each State as between each other. Constitutionality of a decree having this effect would appear to be open to serious question in view of the absence of the appropriations as parties to the case."

The conclusions above set forth would seem to preclude the kind of recommendations contained in paragraphs 3 and 4 at pages 177 and 178.

Joint operation of the reservoirs is discussed in the Master's Report at pages 143 to 145 inclusive, and 181 to 185 inclusive. At page 144 it is stated there would be certain obvious advantages in joint operation, but it is concluded that the same would be violative of priorities and of the storage rights created by the Government contracts. Those having the right to use water under the storage contracts are entitled to such supply as is required for beneficial use, and no more. This Defendant proposes an allocation of supply which will provide the requirements of beneficial use. We believe the record discloses this can be done, and if it is accomplished, users of reservoir supplies are entitled to no more. Furthermore, there is nothing in the record to indicate that any greater supply will be available for storage users by operations in accordance with priorities. After all, it is a matter of bookkeeping and the total supply can not be enhanced by priority operation of the reservoirs.

The United States has proposed what we conceive to be a feasible plan of joint operation (U.S. Ex. 265), and the Master finds same to be advantageous (M.R. p. 144). The Master also finds that the water supply studies disclose that under a long-term operation, involving the use of all reservoirs, and the pooling of natural flow and storage, accompanied by strict regulation of distribution, the needs of the Kendrick Project and the Whalen-Tri-State Dam section can be reasonably supplied (M.R. p. 66). What reason then can there be for requiring priority administration between the reservoirs, and between them and the State Line canals? In fact, it is indicated by the Master's Report that unless there is joint operation and the pooling of supplies, requirements may not be met, as it is stated that the demands can be reasonably supplied if there is a pooling of supplies, and also that joint operation of the reservoirs is advantageous. The inference is that under some other plan the supply may not meet the demands upon it.

We think the case should be resolved upon such a basis as will not require the entry of a decree dealing with individual canals or irrigation districts or reservoirs, or based upon the relative rights of such projects. The suit is one between states, which should be detemined as such, and an apportionment made between the respective states. The water supply should be apportioned, and it is not the function of the Court to apply a type of administration between certain projects.

In the solution of the case, which we believe should be applied, joint operation of reservoirs or the pooling of supplies is not a necessary component. Therefore, we do not urge that there must be joint operation of the reservoirs and the pooling of reservoir supplies for the purpose of making such a mass allocation between the states as we believe meets the demands of the situation, but we do say that joint operation of reservoirs and the pooling of reservoir supplies should not be prohibited by the decree.

6. ALLOCATION FOR KENDRICK PROJECT

The Kendrick is a dual purpose, or combined power and irrigation project. It is designed for the production of power at Seminoe Dam, which is in the channel of the stream and serves to impound the waters of Seminoe Reservoir. This Reservoir is 30 miles above Pathfinder. The additional project reservoir is the

Alcova, 13 miles below Pathfinder, and its primary purpose is to raise the level of the water in the river to permit diversion to the Casper canal, serving the lands of the project. It is also useful for storage conservation. Its capacity is 190,500 acre feet, while that of Seminoe is 1,026,000. This is a Federal Reclamation Project ,and the construction cost is estimated at $19,350,000.00. The foregoing facts appear at page 35 of the Master's Report.

Seminoe Reservoir is located in the channel of the stream and the making of power is a non-consumptive use. There is no conflict between the use of water for power and its later use for irrigation, and power may be developed at Seminoe without diminution of the irrigation supply.

The total irrigable acreage of the project is 66,000, but 60,000 is considered as the acreage which may be irrigated continuously from year to year, and as the proper basis for determining water requirement. The requirements of the project are set forth at page 138 of the Master's Report. A diversion of 168,000 acre feet during the May-September months will furnish the needed 2.8 acre feet per acre for 60,000 acres. The annual return flow will be 96,000 acre feet, of which 46,000 will occur in the May-September period and 50,000 in the winter months (M.R. p. 138). Additional evaporation losses will occur by the operation of the Seminoe and Alcova Reservoirs, amounting to 40,000 acre feet per year (M.R. p. 142). Disregarding the winter return flow, which is not available to supply May-September requirements of the Whalen-Tri-State Dam section, the net seasonal consumptive use of the Project is the headgate diversion of 168,000 acre feet, plus reservoir losses of 40,000 acre feet, or a total of 208,000 acre feet, less the 46,000 acre feet of May-September return flow, leaving 162,000 acre feet. The latter value represents the amount of water which will be taken from the May-September supply by operation of the entire project.

The Master's Whalen-Tri-State Dam requirement is 1,027,000 acre feet (M.R. pp. 60, 61): It becomes pertinent to inquire how much of this supply is available below Alcova and how much must be released at Alcova. From W-173 (Appendix p. 40) it appears that the average gain in the stream between Pathfinder and Whalen, which occurred historically during the 37-year period, 1904 to 1940, was 141,000 acre feet for the May-September months. This is after all use for irrigation in the section from Alcova to Whalen has been made, exclusive of the

Kendrick Project. It is a net supply arriving at Whalen for use below. The Master's proposed decree restricts irrigation from the main stream, exclusive of the Kendrick Project, between Alcova and Whalen to present uses. Therefore, this accretion will be available in any similar future period.

In addition, there was available during the drouth decade, 1931 to 1940, an average May-September accretion of 63,220 acre feet between Whalen and the Wyoming-Nebraska State line, as disclosed by Table III, Page 67 of the Master's Report. This did not include the Laramie River which, according to the same Table, made an average May-September contribution for the same years of 23,230 acre feet. From examination of the Whalen state line accretion, and the Laramie River inflow for such years of more plentiful supply as 1933 and 1938, as reflected by Table III, page 67 of the Master's Report, it is obvious that in periods of more favorable conditions the accretion in this section and the contribution of the Laramie River will be substantially more than the 1931-1940 averages. However, using the drouth decade values for these sources of supply, and adding to them an accretion of 141,000 acre feet, such as occurred on the average, 1904 to 1940, in the section between Alcova and Whalen, we have a total supply of 227,450 acre feet originating between Alcova and the state line in the May-September period. One source of additional supply above the Whalen-Tri-State Dam section has not heretofore been considered, nor it is mentioned in the Master's Report. Spring Creek, a tributary of the North Platte, enters the stream below the Wyoming-Nebraska state line and above the Tri-State dam. Testimony concerning same appears at pages 27387 to 27389 of the Record, and is reflected by Wyoming Exhibit No. 150. Since the exhibit itself discloses all pertinent information, same is incorporated in the Appendix, page 77, without inclusion of the related testimany. From this exhibit it appears that the average May-September contribution of this stream was 2,855 acre feet. A number of unusually dry years are included in this period and we think it safe to use a round figure value of 2,900 acre feet. Taking this supply into account, together with the accretions between Alcova and the state line, there is a total of 230,350 acre feet which, for conveniences, we will assign as 230,000. Therefore, of the 1,027,000 acre feet required in the May-September period in the Whalen-Tri-State Dam section, 230,000 is available from sources below Alcova.

Consequently, under average conditions prevailing in the 1904 to 1940 period, excepting only that we have used for accretions below Whalen and contribution of the Laramie River drouth decade values of 1931 to 1940 as taken from Table III, page 67 of the Master's Report, 230,000 acre feet may be supplied below Alcova, leaving the required release at Alcova 797,000 acre feet. The average annual evaporation loss of Pathfinder Reservoir is 45,000 acre feet, as shown in Column 9 of W-170 (Appendix pp. 38-39). If this is added to the required release of 797,000 acre feet the total is 842,000. While Pathfinder Reservoir has a capacity of 1,045,000 (M.R. p. 30), it is necessary to have available only 842,000 acre feet during the May-September period each year to supply the Master's proposed requirements for the Whalen-Tri-State Dam section. No winter release at Alcova is allowed and consequently the entire demand upon Pathfinder Reservoir is 842,000 acre feet, under the Master's proposals. This is the amount of water which it is necessary to have available in order to provide the lands dependent upon Pathfinder supply with the supply to which they are entitled under the Reclamation Act, which makes beneficial use the basis, the measure and the limit of the right. (Section 8 of the Reclamation Act of June 17, 1902, 32 Stat. 390, 43 U.S.C.A. 372.)

Coming now to consideration of additional supply required for the Kendrick Project, in conjunction with the demand upon the Pathfinder supply, we find that we must add to the required Pathfinder supply a May-September net consumptive use of the Kendrick of 162,000 acre feet, making a total of 1,004,000 acre feet. This is to say, that if this amount of water is available at Pathfinder, and if accretions below are taken into account, the demands of the North Platte project and the Kendrick and other users can be supplied. The 1904-1940 average recorded run-off at Pathfinder was 1,315,900 acre feet (M.R. p. 24) and this run-off reduced to present conditions of development is 1,293,000 acre feet (Col. 8, W-170, Appendix pp. 38-39). There is a liberal excess of average run-off over requirement; the difference between 1,004,000 and 1,293,000 being 289,000 acre feet. These values demonstrate the lack of any necessity for taking into account the total average run-off as measured against the total demand, and we think permit an adequate consideration of low years of run-off. Especially is this true when account is taken of the carry-over capacity of the reservoirs, their ability to conserve

supplies from a year or years of large production to a succeeding year or years of low run-off, a subject which we discussed in some detail under the heading "Reservoir System of North Platte and Kendrick Projects" heretofore. We do not mean to intimate that the average supply is necessarily a proper criterion to be used, but only to point out that the demand upon the stream is substantially less than such average. If we take into account the run-off of the years 1895 to 1903 inclusive at Pathfinder, heretofore set out in tabular form under the heading "Available and Dependable Supply," the conclusion is not changed since the average of those years was 1,342,000 acre feet. Therefore, over a period of 46 years, 1895 to 1940 inclusive, average run-off was substantially in excess of the combined requirements of the Whalen-Tri-State Dam section and the Kendrick Project.

The Kendrick is the junior project on the stream. Priority of Seminoe Reservoir is December 1, 1931, the Casper Canal, for natural flow, July 27, 1934, and Alcova Reservoir April 25, 1936 (M.R. p. 138). In that respect it occupies the same position as the Laramie-Poudre Tunnel Project for trans-mountain diversion in Wyoming v. Colorado, 259 U.S. 419. In that case it was found that the proper priority of this Project was October 1909, and that 181,500 acres of land in Wyoming had senior priorities and required 272,500 acre feet of supply. The total available supply was determined to be 288,000 acre feet, leaving 15,500 acre feet for the junior Laramie-Poudre tunnel (259 U.S. 495,-496). Allocation was made to Colorado of 39,750 acre feet, including 15,500 acre feet for the tunnel as is fully explained in the later decision in Wyoming v. Colorado, 309 U.S. 572 at pages 576, 577. The situation here points to the propriety of the same solution as was applied in Wyoming v. Colorado by the inclusion in a mass allocation to Wyoming of a supply for the Kendrick Project. We do not seek to disturb the conclusions and recommendations of the Master with reference to Wyoming's proposed allocations, other than for the Whalen-Tri-State Dam section and the Kendrick Project, and with reference thereto we say that instead of the recommendations contained in paragraphs 3, 4 and 6 of the Master's Report, pages 177 to 179 inclusive, an allocation should be made to Wyoming of 405,000 acre feet, comprising 237,000 for use in the Whalen-Tri-State Dam section and 168,000 for the Kendrick, and an allocation of 790,000 to Nebraska, unless Nebraska's allotment may be reduced by

reason of reduction in requirements which we shall propose hereinafter.

The decision in Wyoming v. Colorado went only to the extent of fixing the quantity for Colorado of 39,750 acre feet, leaving the balance of the supply for Wyoming. In this respect Colorado, the upper state, may have derived an unfair advantage since she is permitted to divert her allotted quantity each year regardless of what the remaining supply may be for use in Wyoming. The Master found that the average supply for Wyoming, received from the Laramie River for the years 1911 to 1938 inclusive, was only 242,500 acre feet (M.R. p. 269) instead of the 272,500 considered necessary for the use of Wyoming appropriators by the terms of the decision in Wyoming v. Colorado, 259 U.S. 419, page 496. We do not make any attack upon the decree in the Laramie River case, but seek only to point out to the Court what we conceive to be the superior equities of the plan which we propose in the instant case. Our proposal is that mass allocations be made to Wyoming and Nebraska, as above set forth, and each state limited thereto, with a further proviso that in the event of unforeseen conditions, making delivery of the entire requirements impossible, the shortage shall be sustatined by the states in proportion to their respective allotments. Under such a plan, Wyoming, the upper state will not obtain the advantage of an assured supply nor will such privilege be enjoyed by the lower state, but each state will suffer proportionately and equitably in the event of impossibility to meet requirements.

Heretofore we discussed the available and dependable supply showing that for a period of 46 years, 1895 to 1940 inclusive, assuming the existence of all reservoirs and all present uses, there would have been a dependable supply which would have furnished the Master's proposed requirement of 1,027,000 acre feet for the Whalen-Tri-State Dam section, and 168,000 acre feet of headgate diversion for the Kendrick Project. Therefore, under our proposed solution of the case, unless conditions are more adverse in the future than they have been in the past, shortages will not occur. There is no basis upon which to assume any smaller run-off than occurred in the 1931-1940 decade, which is included within our 46 year period. The extremely small production of these years is emphasized in the Master's Report, pages 39 and 40.

In order to give adequate consideration to the problem of

initiating a new project during a period of low run-off, we adopt the suggestion which was made by the United States, that irrigation, under the Kendrick Project, should not be commenced until storage in Pathfinder Reservoir, plus anticipated in-flow, equals 1,000,000 acre feet (M.R. p. 139). As we understand the proposal, it contemplates that water should not be diverted to the lands of the Kendrick Project until, at the commencement of the irrigation season, the storage and anticipated in-flow equals 1,000,000 acre feet. Since the North Platte and Kendrick are Bureau of Reclamation projects, we propose that it may be left to the decision of the Bureau to determine when storage, plus anticipated in-flow, equals the required amount.

The facilities of the Kendrick Project have been constructed for the purpose of irrigation of 66,000 acres of land but the distribution system of only the first unit, serving 35,000 acres, has been completed. The canals and laterals of the second are under construction (M.R. p. 35). It is a recognized fact that development of any project requires some considerable period of time, and that when water is available it is ordinarily a period of several years before all of the irrigable land is put into cultivation. We think it unnecessary to present any detail as to the evidence on this subject, because we believe no other litigant will disagree. In our opinion, it will take five years to develop the 35,000 acres in the first unit of the project. This being true, a supply for the first unit is all that will be required during the initial five years, after commencement of irrigation. The United States, through its witness Mr. Dibble, presented the requirement of the 35,000 acres in the first unit as 105,000 acre feet, upon the basis of 3 acre feet per acre, it being explained that a somewhat larger headgate requirement per acre is necessary upon a portion of the lands than will be required when the entire project is developed. The requirement of the first unit is specified on U.S. Exhibit 261, and testimony relative thereto appears at pages 28565 and 28567 of the Record. In an excerpt from the exhibit, appearing at page 78 of the Appendix, will be found the May-September requirement of the 35,000 acres in the first unit as presented by the United States.

Since it can not be reasonably anticipated that any water will be needed for the second unit until five years after commencement of operations, we propose that, during the initial five-year period after water is first supplied to the Kendrick Project, the

Wyoming allocation for the Kendrick and the Whalen-Tri-State Dam section, shall be 342,000 acre feet instead of 405,000. The reduction is 63,000 acre feet, or the difference between the full requirement of the Kendrick Project of 168,000 and the first unit requirement of 105,000 acre feet.

7. REQUIREMENTS IN WHALEN-TRI-STATE DAM SECTION

Our argument has thus far proceeded upon the theory of supplying the Master's proposed May-September requirement of the Whalen-Tri-State Dam section of 1,027,000 acre feet. We have so proceeded for the purpose of showing the adequacy of the supply to meet this demand. However, it is our opinion that the requirements for the Interstate, Tri-State and Northport canals for use of Nebraska lands are excessive, and that the demand of the Ramshorn should be eliminated. The totatl reductions resulting therefrom would be 85,000 acre feet, and we contend Nebraska's allotment should therefore be reduced from 790,000 acre feet to 705,000.

It is not proposed that any allotment be made to any individual canal or group of canals, but in order to determine the amount of water to which the state of Nebraska is entitled, it is necessary to consider the needs of the individual canals. The amount of water which any state needs, or to which it may be entitled, can only be determined from the total requirements of its appropriators. The Nebraska requirement must be made up of the sum of the needs of the individual canals diverting water in the Whalen-Tri-State Dam section for use upon Nebraska lands.

In arriving at the requirement of a particular canal, the Master has quite uniformly followed the procedure of determining the acreage in need of water, the amount of water which must be delivered to the land for the production of crops in acre feet per acre, and the losses in the distribution system. From these factors the head-gate requirement is determined.

Interstate Canal

An annual supply of 465,000 acre feet has been determined by the Master as necessary for the Interstate canal, comprising 46,000 acre feet to supply the Lingle and Hill Districts in

Wyoming, and 419,000 acre feet for the Pathfinder District embracing both Nebraska and Wyoming lands (Table II, M.R. p. 59). All of the lands under the Pathfinder District are in Nebraska excepting 2,300 acres, with a requirement of approximately 10,000 acre feet (Table XVII, M. R. p. 86). Detailed discussion of the requirement of this canal is contained at pages 204 to 215 of the Master's Report. Therefrom it appears that a delivery of 1.8 acre feet per acre at the land is allotted, which is stated to be on the "liberal side" (M.R. p. 210). A distribution system loss of 58 per cent for the Pathfinder Irrigation District is allowed, and in connection therewith it is stated that any error in this figure "would be on the upper, rather than the lower side" (M.R. p. 213). The acreage under the Pathfinder Irrigation District of 98,000, apparently is based upon the 1931-1940 average of the "developed farms irrigable acreage" (M.R. pp. 208, 209). At page 208 of the Master's Report it is stated that the "developed farms irrigable acreage" is not the acreage actually irrigated each year, but is to some extent in excess thereof. It is also pointed out that "irrigated acreage" on W-156, and "net cropped acreage" on W-157 correspond very closely, except for the years 1934 and 1936 (M.R. p. 208). This leads to the inference that the "net cropped acreage" on W-157 is essentially the irrigated acreage. Wyoming Exhibit 157 is a compilation containing the "developed farms irrigable acreage" and the "net cropped acreage" of the Pathfinder Irrigation District, and the values for the 1931-1940 decade are as follows:

Year	Developed Farms Irrigable Acreage	Net Cropped Acreage
1931	105,143	90,427
1932	103,366	88,642
1933	100,763	81,446
1934	98,994	78,360
1935	98,485	81,744
1936	92,296	76,650
1937	97,385	82,186
1938	96,793	83,174
1939	92,494	80,956
1940	93,335	82,187

The average of the "developed farms irrigable acreage" 1931 to 1940 is 97,905, while that of 1936 to 1940 is 94,460. The aver-

age of the "net cropped acreage" 1931 to 1940 is 82,577 and 1936 to 1940, 81,030.

A liberal delivery at the land of 1.8 acre feet per acre has been allotted and a distribution system loss of 58 per cent which, according to the Master, if it is in error, errs on the upper rather than on the lower side. It also seems apparent that a liberal acreage value has been used and one which is considerably in excess of the actual irrigated acreage under present conditions. An exact adjustment of these different values would require the consideration of a large amount of testimony. We believe the demands of justice can be met by reducing the acreage to the 1936-1940 average of the "developed farms irrigable acreage" or, in round figures, 94,500 acres. Since it is necessary to divert 4.28 acre feet per acre at the headgate to deliver 1.8 acre feet per acre at the land, with a loss factor of 58 per cent (M.R. p. 213), the total reduction we propose is 4.28 acre feet per acre for 3,500 acres, or 15,000 acre feet.

One of the elements which must be considered in determining the May-September requirement of the Pathfinder Irrigation District, under the Interstate canal, is the amount of water which can be diverted to the inland reservoirs serving the Pathfinder District lands, Lakes Alice and Minatare. The capacities of these reservoirs are respectively 11,400 and 67,000 acre feet (M.R. p. 30). The Master's allowance for winter diversions to the reservoirs is 46,000 acre feet (M.R. pp. 60, 61). Whatever is diverted to these reservoirs in the winter months reduces the May-September requirement as the water is stored and used in the succeeding irrigation season. In our opinion the Master's Report (pp. 60, 61) contains no adequate explanation for the allowance of only 46,000 acre feet. It is said that icing of the canal may have been a factor in past operations (M.R. p. 61). We have been unable to find any evidence in the record supporting such a conclusion.

Storage impounded in the Government reservoirs is utilized for the Pathfinder Irrigation District, and Barry Dibble, a witness for the United tSates testified that 73,000 acre feet could be diverted to Lakes Alice and Minatare during the winter months (Record pp. 28696, 28697). This witness made the water supply study comprised in U.S. Exhibits 267 to 273, discussed in the Master's Report, pages 65 to 67 inclusive. This study covered the period from 1926 to 1940, and Mr. Dibble used

as basis for his May-September demand the diversion of 73,000 acre feet to the inland reservoirs during each winter season. The Dibble testimony on this subject appears at pages 78 and 79 of the Appendix. We know of no reason why this testimony as to the winter diversion may not be accepted. Upon the same subject Elmer K. Nelson, witness for Wyoming, testified that diversions of 65,000 acre feet could be made in the winter months to the inland reservoirs (Record, pp. 27444-27446).

If the testimony of Mr. Dibble is used, the May-September requirement of the Pathfinder Irrigation District will be reduced 27,000 acre feet, which is the difference between 46,000 acre feet of winter diversions, specified by the Master, and 73,000. The lands served by the inland reservoirs lie wholly within the State of Nebraska.

No mention whatever is made in the Master's Report of a supply that is available from pumps for Nebraska lands in the Pathfinder Irrigation District. The testimony is undisputed and appears at page 29243 of the Record. The project history of the Pathfinder Irrigation District for the year 1940, as quoted at page 29243, is as follows:

> "An important factor in curing seeped conditions of farm lands is the fact that seventy-five irrigation wells were drilled and operated by pumping during the past season. There was about 7,640 acre feet of water pumped from the underground supply and 550 acre feet from drains. The total water pumped was equal to almost sixteen per cent of the amount of water delivered to the lands."

The supply diverted at the headgate for this canal in 1940 was quite low, as shown by Table VII, page 76 of the Master's Report. If such a supply of water as is disclosed was available from pumps in such a low water year as 1940, it is obvious that it would not be less, but would probably be considerably more under less adverse conditions.

Since the 7,640 acre feet is available at the land and the distribution system loss of the Pathfinder Irrigation District is 58 per cent (M.R. p. 213) this supply is the equivalent of 18,000 acre feet at the headgate, as it would require the latter amount of water diverted at the headgate with loss of 58 per cent in

the distribution system, for delivery of 7,640 acre feet at the land.

The May-September requirement of the Pathfinder Irrigation District, as specified by the Master, is the annual requirement of 419,000 acre feet, less 46,000 acre feet of winter diversion, or 373,000 acre feet (M.R. pp. 59 to 61). In our opinion this May-September demand is excessive and should be reduced on the bases hereinabove mentioned comprising 15,000 acre feet because of excess acreage of 3,500 acres, 27,000 acre feet on account of additional winter diversions, and 18,000 acre feet on account of supply from pumps, or a total of 60,000 acre feet, leaving the May-September demand as 313,000 acre feet.

The total annual requirement of the Whalen-Tri-State Dam section, as shown by Table II, page 59 of the Master's Report, is 1,072,514 acre feet Winter diversions of 46,000 acre feet reduce the annual demand to 1,026,514 acre feet for the May-September period. Upon the basis of the values in Table II, page 59 of the Report, and allowing 9,844 acre feet of the Pathfinder Irrigation District demand for Wyoming, as disclosed by Table XVII, page 86 of the Report, the May-September demand of 1,026,514 acre feet is apportioned between Wyoming and Nebraska on the basis of 236,921 acre feet for Wyoming, and 789,593 for Nebraska. However, the Master has substituted for the actual May-September requirement of 1,026,514 acre feet a round figure value of 1,027,000 acre feet. Allowing 237,000 acre feet for Wyoming and 790,000 for Nebraska gives Wyoming the benefit of only 79 acre feet of this excess, while Nebraska derives 407 acre feet. Additionally, Table II, page 59 of the Master's Report, shows 148,000 acre feet for the Tri-State canal after deduction of Tri-State interceptions, according to footnote 2 at the bottom of the page of 35,500 acre feet from the requirement of 183,050. The actual result is 147,550 which the Master designates as 148,000, thereby favoring Nebraska to the extent of 450 acre feet. In using these round figure values the result is that Wyoming's allotment, which we propose of 237,000 acre feet, gives this Defendant the benefiit of only 79 acre feet, while Nebraska obtains the benefit of 857.

Since the supply from pumps, above mentioned, is utilized in Nebraska, and since the reservoir supply of the inland reservoirs is utilized wholly in Nebraska, the deductions we propose in connection therewith should be made from the Nebraska

supply. As to the reduction resulting from reduced acreage of the Pathfinder Irrigation District of 15,000 acre feet, as has been set forth heretofore, only 2½ per cent of the Pathfinder Irrigation District supply is utilized in Wyoming. 2½ per cent of the proposed reduction of 15,000 acre feet is 375 acre feet. More than twice this amount is set off by the excess to Nebraska in the use of round figure values as above explained. Consequently we believe it entirely just that all of the proposed reductions under the Interstate canal should be taken from the 790,000 acre feet of demand for Nebraska lands in the Whalen-Tri-State Dam section.

Tri-State Canal

As to the Tri-State canal, a distribution system loss of 48.5 per cent is adopted, which, according to the Master, appears warranted but "ample," (M. R. p. 244) and delivery at the rate of 1.8 acre feet per acre is specified (M. R p. 244), which, with reference to the Interstate, the Master says appears to be on the "liberal side" (M. R. p. 210). Acreage is "liberally represented" by 52,300 acres (M. R. p. 243).

An adjustment of the acreage value is indicated by the findings of the Master. Prior to 1932 there is no record or direct evidence as to extent of actual irrigation (M. R. p. 242). In 1932 the area served with water was approximately 50,151 acres (M. R. p. 240). All land to which water has been delivered since and including 1933 appears in the high value column on page 24 of Nebraska exhibit 489 (M. R. p. 239). The acreages for the respective years, shown in the high value column on page 24 of Nebraska exhibit 489, are as follows:

Year	Irrigated Acreage
1933	48,070.5
1934	48,231.8
1935	47,903.5
1936	48,452.6
1937	50,722.2

The same values appear as Irrigated Acreage in the Table at page 242 of the Master's Report. An average of the five years, 1933 to 1937, is 48,676 acres. However, the testimony

discloses that of the 1937 acreage of 50,722.2, 791.8 acres were not irigated, comprising railroad right of way of 337 acres, Bayard town lots of 60 acres and 394.8 acres of sub-irrigated land (M. R. p. 240). Making this deduction for 1937 the irrigated land for that year was 49,930.4 acres. If this value is used for 1937 and an average then taken of the years 1933 to 1937 inclusive the result is 48,518 acres.

The irrigated acreage of the years 1927 to 1931, as disclosed at page 242 of the Master's Report, is based upon the assumptions stated in the paragraph immediately preceding the tabulation. The validity of such assumptions may properly be questioned because of higher values for the years preceding 1932 than those of subsequent years. In any event the Complainant had full opportunity to present evidence of the most favorable character to her and in the absence of direct evidence as to acreage irrigated prior to 1932, it appears unwarranted to indulge in any assumptions concerning same. Facts found should be based upon the evidence in the record and a case should not be made out for Complainant upon assumptions as to what the evidence might be when Complainant had adequate opportunity to present the facts. As mentioned by the Master (M. R. p. 238), over 800 pages of record is devoted to the question of acreage under the Tri-State canal. In such a wealth of evidentiary material, it seems the Court ought to be able to base necessary conclusions upon actual facts, and that Complainant had ample opportunity to present her case in the most favorable light.

Using the aerial survey method, Colorado made a determination of 48,900 acres (M. R. p. 242).

Our conclusion is that 49,000 adequately represents the demand acreage of this canal and that a requirement should be based thereon. This is more than the average of the years 1933 to 1937, and of the years 1932 to 1937. There is no direct testimony as to any other year. It is slightly in excess of the 48,900 acre feet determined by the aerial photographic study which is a recognized means of great accuracy in determining irrigated acreages.

The Farmers Irrigation District has a Warren Act contract for the supply of lands under the Tri-State canal, and the contract quantity is 180,000 acre feet (M. R. pp. 189, 190). The liberal values used by the Master result is a requirement

of 183,000 acre feet, which is 3,000 in excess of what this canal is entitled to under the contract. That the contract evidences an intent to limit the total water to be delivered from all sources to the amount specified, is the conclusion of the Master at page 195 of his Report.

49,000 acres is 3,300 acres less than the 52,300 specified by the Master, and since the diversion rate is 3.5 acre feet per acre (M. R. p. 244), elimination of this excess acreage would result in a reduction of 11,500 acre feet. All lands served by the Tri-State canal being in the State of Nebraska, the Nebraska apportionment should be reduced 11,500 acre feet.

Northport Canal

The Northport is a North Platte Project canal serving lands in Nebraska, water for which is diverted at Tri-State dam and carried through the Tri-State canal a distance of 80 miles to the Red Willow rating flume (M. R. p. 231). There was no direct evidence as to losses but the Master, in arriving at a distribution loss of 57.5 per cent allowed 30 per cent for losses in the Tri-State canal between the headgate and Red Willow (M. R. p. 232). The discussion in the Master's Report at page 232, discloses that the 57.5 per cent adopted is a very liberal figure. The same 1.8 acre feet per acre at the land is allowed (M. R. p. 232) which is stated to be on the "liberal side" when specified for the Interstate (M. R. p. 210).

In footnote 2, at page 59 of the Master's Report, it is said that 35,500 acre feet of water was intercepted on the average during the 1931-1940 period by the Tri-State canal from certain flows below Tri-State dam. The reference is to the diversion and use during the May-September period of supplies from return flow channels entering Tri-State canal below the headgate at Tri-State Dam. In the note at page 59 it is said these interceptions presumably will go to the Northport Irrigation District under the decision of United State v. Tilley, 124 F. (2d) 850. As far as total water supply is concerned, the demand upon Wyoming remains the same whether these interceptions are used by the Farmers Irrigation District, under the Tri-State canal, or by the Northport District. However, in determining the loss for the Tri-

State the Master gave no consideration to these intercepted supplies, as appears from his discussion at pages 243 and 244 of his report. The reference at page 244 to the benefit of some unmeasured drainage from a project above, followed by record references at page 11543, does not relate to these intercepted supplies, as is readily apparent from reading the record at that page.

Since interception of these supplies was not taken into account in determining the Tri-State loss, and assuming that in the future they will go to the Northport, as suggested by the Master, some reduction in the Northport loss is indicated. Obviously water entering the Tri-State canal below Tri-State dam from the return flow channels will be subjected to less loss than if carried the entire distance from the Tri-State headgate to Red Willow. The return flow channels are shown upon U. S. exhibit No. 87, which was introduced at page 20507 of the Record. The liberal allowance for losses on the Northport (M. R. p. 232), and the reduction that will no doubt be accomplished in the future by reason of the use of these intercepted supplies leads to the conclusion that the requirement for the Northport canal should be reduced 30 per cent of the 35,500 acre feet, which will be intercepted. The 30 per cent value is used because that is the transmission loss between the Tri-State headgate and Red Willow, and while some of the intercepted water originates above Red Willow, in our opinion the liberal loss factor of 57.5 per cent warrants the reduction suggested. 30 per cent of 35,500 acre feet is 10,600, which deducted from the Northport requirement of 54,600 acre feet (M. R. p. 232), leaves 44,000 acre feet. Only Nebraska lands are supplied by the Northport so that the allotment to Nebraska for use in the Whalen-Tri-State Dam section should be reduced 10,600 acre feet.

Ramshorn Canal

An allotment for the Ramshorn Canal of 3,000 acre feet is included in the Master's Whalen-Tri-State Dam requirement (M. R pp. 59 and 245). The Tri-State Dam headgate is one mile below the Wyoming-Nebraska State line (M. R. p. 53). The headgate of the Ramshorn is 4.4 miles below the state line, as shown by Wyoming exhibit 177. Therefore, the distance between the Tri-State and Ramshorn head-

gates is three miles or more. This fact is confirmed by the map facing page 57 of the Master's Report. While the Master has included the Ramshorn canal as within the Whalen-Tri-State Dam section, in comparing supply with requirement, as disclosed in Table III at page 67 of his report, he has failed to take into account the supply entering the stream below the Wyoming-Nebraska state line and above Tri-State Dam, since in the tabulation only the accretion to the state line is included. Spring Creek is a tributary entering the stream below the Wyoming-Nebraska state line and above Tri-State Dam as disclosed by Wyoming exhibit 150, and the testimony concerning same at pages 27387 to 27389 of the record. The exhibit, which is self-explanatory, is at page 77 of the Appendix. Therefrom it appears that the average May-September run-off of Spring Creek is 2,855 acre feet, as compared with the Ramshorn requirement of 3,000. While there is undoubtedly additional invisible return to the stream between the Wyoming-Nebraska line and the headgate of the Ramshorn, the measured accretion of Spring Creek is almost the equivalent of the Ramshorn requirement. Since this canal can be supplied by accretion below the Wyoming-Nebraska state line which the Master has not included in the supply for the Whalen-Tri-State Dam section, its requirement should be eliminated.

Conclusion

The consideration of basic values resulting in the allowance of "liberal" supplies for the Interstate, Tri-State and Northport is out of harmony with the principles of this Court announced in Wyoming v. Colorado, 259 U. S. 419, where, in measuring the respective rights of the states, it is said:

> "Both are interested in the stream and both have great need for the water. Both subscribe to the doctrine of appropriation, and by that doctrine rights to water are measured by what is reasonably required and applied. Both states recognize that conservation within practicable limits is essential in order that needless waste may be prevented and the largest feasible use may be secured. This comports with the all pervading spirit of the doctrine of appropriations and takes appropriate heed of the natural ne-

cessities out of which it arose. We think that doctrine lays on each of these states a duty to exercise her right reasonably and in a manner calculated to conserve the common supply." (259 U. S. p. 484).

The large distribution system losses, such as 58 per cent for the Interstate and 57.5 per cent for the Northport, invite the particular scrutiny of this Court in the light of the principles announced in Wyoming v. Colorado supra.

As to the State of Nebraska we believe a reduction should be made in Whalen-Tri-State Dam requirements as follows:

Interstate Canal	60,000 acre feet
Tri-State Canal	11,500 acre feet
Northport Canal	10,600 acre feet
Ramshorn Canal	3,000 acre feet
Total	85,000 acre feet

This would reduce the Nebraska requirement from 790,000 acre feet to 705,000.

8. RETURN FLOW OF KENDRICK PROJECT

Paragraph 5 of the recommendations for decree, page 178 of the Master's Report, enjoins Wyoming from the "recapture" of return flow water of the Kendrick Project after it shall have reached the North Platte river, and from diverting water from the stream at or above Alcova as in lieu of Kendrick return flow. What is meant by this injunction is not clear. Presumably the recommendation is connected with the discussion of Kendrick return flows, pages 185 to 188 of the report. It is there concluded that when return flow water of the Kendrick Project reaches the North Platte River it must be held to be abandoned by the United States, in consonance with the general rule that return flows no longer belong to a project or appropriator after their return to the parent stream. We believe the conclusions in this respect entirely sound and do not question them.

We assume that the restriction proposed in paragraph 5 of the recommendations (M. R. p. 178) is intended to operate against the United States, but is imposed upon Wyoming on the theory that this defendant is responsible for and has control of appropriations and use of water within

her jurisdiction. Perhaps the purpose of the restriction is to prevent the use of Kendrick return flow for the irrigation of lands in Wyoming below Alcova. If that is the intent, it is wholly unnecessary because the Master has found that Wyoming should be restricted to the irrigation from the main stream of 15,000 acres between Alcova and Guernsey (M. R. pp. 147, 148), and this is incorporated in the recommendation of paragraph 2 at page 177 of the report, where this acreage is included with the 153,000 acres upon the main stream and tributaries above Pathfinder, making the total of 168,000 there mentioned. Since Wyoming is restricted in uses above Pathfinder to 153,000 acres from the main stream and tributaries (M. R. p. 135 and p. 177, par. 2), there can be no necessity for the restriction contained in paragraph 5 of the recommendations against the diversion of water from the river at or above Alcova in lieu of Kendrick return flow reaching the stream below Alcova. Restrictions imposed upon Wyoming, both as to the area above Pathfinder and as to irrigation from the main stream below Alcova, make wholly unnecessary any such injunction as is proposed in paragraph 5.

Not only is the proposed injunction unnecessary; it is wholly inequitable. When the return flow of the Kendrick Project reaches the parent stream, the North Platte river, it becomes public water not owned by any one, in accordance with the authorities cited and conclusions of the Master at pages 185 to 188 of his report. When it thus becomes public water and a part of the common supply, it is as much subject to diversion by Wyoming as by Nebraska. Because of the restrictions above mentioned, it can not be diverted by Wyoming between Alcova and Guernsey in such a way or to such an extent as will increase Wyoming's use, since this defendant is enjoined from irrigation of more than 15,000 acres in that section. The use of water in the section cannot be increased by the diversion of Kendrick return flow. There is no possible means of segregating this return flow from other accretions in the section which averaged 141,000 acre feet in the May-September period, 1904-1940, as disclosed by W-173 (Appendix p. 40). Because Wyoming is to be limited to the irrigation of 15,000 acres from the main stream between Alcova and Guernsey, which repre-

sents present uses, there will be no additional use in this area and consequently the return flow of the Kendrick Project will necessarily reach Guernsey, and be available for use in the Whalen-Tri-State Dam section. The May-September return will be 46,000 acre feet (M. R. p. 138). This water will comprise a part of the natural flow and will be subject to use by Wyoming appropriators as well as by those of Nebraska. If the recommendations of paragraph 6 of the Master (M. R. p. 179) are adopted, 25 per cent thereof will be available for Wyoming use and 75 per cent for Nebraska. If the plan which we propose is adopted, this water will become a part of the common supply in the Whalen-Tri-State Dam section, subject to division between the two states to make up the respective allotments of each.

The proposed injunction apparently conflicts with the Master's recommended division of natural flow in the Whalen-Tri-State Dam section as set forth in paragraph 6 of his recommendations. We think this was not intended and that the recommendations arose from a fear that the United States, in operating the Kendrick Project, might seek to utilize this return flow upon some new or additional development. Such a fear is wholly groundless because of the restrictions placed upon Wyoming use between Alcova and Guernsey.

In our exception on this subject, No. XXVIII, we did not object to the restraint against diversion of water above Alcova as in lieu of the Kendrick return flow, feeling that same was harmless. Upon more mature deliberation, we believe that paragraph 5 of the recommendations is wholly unnecessary and should be completely eliminated. Its results would be most mischievous if construed, as it might be, to prevent the use of Kendrick rturn flow on Wyoming lands presently irrigated below Alcova. There is neither necessity nor justice in the attempted imposition of such restraint as Wyoming's use will be limited by the other recommendations of the Master, specifically those in relation to acreage irrigated from the main stream between Alcova and Guernsey, and those concerning use above Alcova. Under the Master's proposals Wyoming would receive only its proportionate share of the natural flow in the Whalen-Tri-State Dam section under the recommendations of paragraph 6. If our solution

of the case is adopted, Wyoming will be limited to a seasonal quantity of 405,000 acre feet, which will serve to limit use below Whalen.

9. A COMPLETE EQUITABLE APPORTIONMENT SHOULD BE MADE

In the first case before this Court involving relative rights of litigant states to the use of water for irrigation, it was said that if the depletion by the upper state, Colorado, continues to increase there will come a time when Kansas may justly say that there is no longer "an equitable division of benefits . . ." (Kansas v. Colorado, 206 U. S. 46, at page 117). The Court then concluded by saying that the Bill of Kansas should be dismissed without prejudice to the right of that State to institute new proceedings whenever the substantial rights of Kansas are being injured to the extent of destroying the "equitable apportionment of benefits between the two states resulting from the flow of the river." (206 U. S. 118). In Wyoming v. Colorado, 259 U. S. 419, it is said that the decision in Kansas v. Colorado was a pioneer in its field, and reference was made to the dismissal of the suit by reason of the determination that Colorao was not taking more than what would be her share under an "equitable apportionment." From these decisions it appears that the term "equitable apportionment" has come to mean a just division of benefits or of the use of water from an interstate stream.

In this cause each of the litigant states has submitted a prayer for equitable apportionment. See Nebraska's Bill of Complaint, pages 32 and 33; Wyoming's Amended and Supplemented Answer, page 28, and Colorado's Answer and Cross Bill, page 49.

In the making of any affirmative decree the function of the Court is the making of an equitable division or apportionment of the benefits or use of water from the North Platte River. Such being the scope of the litigation and the relief sought, we think the Master is in error in basing conclusions, upon which are founded his recommendations for decree, upon conditions of water supply which have prevailed since 1930. (See Par. 10, M. R. pp. 10 and 11). It appears that the Master's approach to the problem is the

imposition of partial injunctive measures based upon temporary conditions of water supply. Such a consideration of the case can not and, we think, has not resulted in recommendations for decree which accomplish an equitable division or apportionment of the use of the water supply between the interested states.

The foregoing discussion leads directly to the conclusion of the Master that his recommendations are not interdependent, and that some of them might be adopted and others omitted (M. R. p. 180). A division or apportionment of the benefits of the stream, or of the use of water therefrom, can not be made between the states on the basis of restraint against one or two states without correlative limitations against the remaining states or state. No equitable apportionment, or in fact any apportionment, can be made by restriction against Colorado alone, or against Wyoming alone, or against Nebraska singly. Particularly in view of the fact that large supplies from Colorado and Wyoming are stored in Wyoming and utilized in both Wyoming and Nebraska does it become necessary for restraint to be placed on each of the states if an apportionment is to be made. The inequity of imposing limitations upon the use by any State, without the imposition of similar limitations upon the other States, is readily apparent. There is no reason why one state should be confined to the use of only so much as her proper share of the common supply unless the other two states are equally limited. This is a fundamental proposition from Kansas v. Colorado, 206 U. S. 46, where this Court said:

> "One cardinal rule, underlying all the relations of the states to each other, is that of equality of right. Each state stands on the same level with all the rest. It can impose its own legislaton on no one of the others, and is bound to yield its own views to none. Yet, whenever, as in the case of Missouri v. Illinois, supra, the action of one state reaches, through the agency of natural laws, into the territory of another state, the question of the extent and the limitations of the rights of the two states becomes a mater of justifiable dispute between them, and this Court is called upon to settle that dispute in such a way as will

recognize the equal rights of both and at the same time establish justice between them." (206 U. S. 97).

We do not believe, therefore, that the recommendations of the Master can be considered as interdependnt, and a part of them adopted and others rejected. Furthermore, if all of the recommendations are adopted, they do not make out a complete equitable apportionment or division between the states, for the reason that, as to the Whalen-Tri-State Dam section and the Kendrick Project, a type of administration only is advocated instead of a division of the supply between Wyoming and Nebraska. The proposals of paragraphs 3 and 4 of the recommendations for decree (M. R. pp. 177, 179) do not comprise a division of the supply between the two states, defining and limiting the amount of water which each is entitled to use, but only that certain individual projects in relation to each other shall be operated on a priority basis, and that certain limitations shall apply to the Nebraska state line canals individually. Canals serving Nebraska lands, such as the Interstate, Fort Laramie and Northport, are not included in paragraphs 3 and 4, and of the total May-September supply for Nebraska which is recommended by the Master of 790,000 acre feet, the canals specifically mentioned represent only a demand of 259,787 acre feet.

Our conclusion is that the Court, in exercising jurisdiction for the making of an affirmative decree, should make a complete equitable apportionment between the three states. This can not be accomplished as simply as was done in Wyoming v. Colorado, 259 U. S. 419, where restricting the upper state to the use of a certain quantity of water served to fix the rights of both. Here there are three states; large supplies originate in Colorado and Wyoming; are impounded in Wyoming, and used in both Wyoming and Nebraska; and large storage reservoirs are located in Wyoming which can only be properly utilized by the conservation and carry over of water from year to year. Just recognition of the rights of each state makes imperative a decree defining completely the rights of each and imposing upon each the limitations necessary to prevent infringement of the rights of any other.

10. THE DECREE

We believe a decree should be entered in this cause as follows:

1. Enjoining Colorado (a) from the diversion of water for the irrigation in North Park of more than 135,000 acres of land, (b) from the accumulation in storage facilities in North Park of more than 17,000 acre feet of water between October 1 of any year and September 30 of the following year, and (c) from the transbasin diversion out of North Park of more than 6,000 acre feet of water between October 1 of any year and September 30 of the following year.

2. Enjoining Wyoming (a) from the diversion of water from the main river above Guernsey and from its tributaries above Pathfinder Reservoir for the irrigation of more than 168,000 acres of land, and (b) from the accumulation of storage water in reservoirs above Pathfinder Reservoir in excess of 18,000 acre feet of water between October 1 of any year and September 30 of the following year. This is exclusive of Seminoe Reservoir and the Kendrick Project, which are given consideration elsewhere.

3. Enjoining Wyoming from the diversion of water from the North Platte River for the irrigation of lands of the Kendrick Project and the Wyoming lands served by diversions at and below Whalen of more than 405,000 acre feet in each irrigation season, May to September inclusive, providing that until five years have elapsed immediately following the commencement of irrigation of lands of the Kendrick Project, the limitation shall be 342,000 acre feet, and further providing that irrigation under the Kendrick Project shall not be commenced until the first year in which storage in the upper storage reservoirs, Seminoe, Pathfinder and Alcova, plus anticipated in-flow equals 1,000,000 acre feet, and that until the year in which such irrigation is commenced, the Wyoming allotment shall be 237,000 acre feet.

4. Enjoining Nebraska from the diversion of water from the North Platte River in the Whalen-Tri-State Dam section for Nebraska lands of more than 705,000 acre feet in each irrigation season, May to September inclusive, and from obtaining the conveyance past the Tri-State Dam of any water originating above that point for diversion from the North Platte River below Tri-State Dam, and permitting diversion of 73,000 acre feet to the inland reservoirs of the Pathfinder Irrigation District, Lakes Alice and Minatare, during the winter months, October 1st to April 30th, inclusive.

5. Providing that the May-September supplies mentioned in the preceding paragraphs 3 and 4 shall be delivered in accordance

with the needs of the appropriators served thereby, and that as a guide to such deliveries, monthly distribution of such May-September supplies, unless otherwise requested, shall be made as follows: 11 per cent in May; 24 per cent in June; 26 per cent in July; 24 per cent in August, and 15 per cent in September.

6. Providing that in the event of shortage of the May-September supplies provided for in paragraphs 3 and 4, same shall be sustained by Wyoming and Nebraska in proportion to the respective allotments to each state, and providing that excesses comprising uncontrolled supplies from reservoir spills originating during the May-September months may be diverted by Wyoming and Nebraska in proportion to the respective allotments made in paragraphs 3 and 4 above.

7. Requiring such additional gauging station and measuring devices at or near the Wyoming-Nebraska state line, if any, as may be necessary for effecting the apportionment decreed above, to be constructed and maintained at the joint and equal expense of Nebraska and Wyoming.

8. Providing that the injunctions herein contained shall not comprise any restriction upon the diversion from the North Platte River and tributaries in Colorado and Wyoming of water for ordinary and usual domestic, municipal and stock-watering purposes.

9. Permitting any of the parties to apply at the foot of the decree for its amendment or for further relief, and retaining jurisdiction of the suit for the purpose of any order, direction or modification of the decree or any supplementary decree that may at any time be deemed proper in relation to the subject matter in controversy, provided that any application for amendment, modification or further relief shall not be made within ten years from date of the decree.

Explanation of Paragraphs 1 and 2

Paragraph 1 is identical with the same numbered paragraph of the Master's recommendations (M.R. p. 177).

Paragraph 2 is identical with the corresponding paragraph of the Master's recommendations, except the last sentence which has been added for purposes of clarity. The 168,000 acres mentioned in paragraph 2 is comprised of 153,000 irrigated from the main stream and tributaries above Pathfinder, (M.R. p. 135) and 15,000 from the main stream between Pathfinder and

Guernsey (M.R. pp. 147, 148). This is exclusive of the Kendrick Project (M.R. Par. 7, pp. 9, 10). The 18,000 acre feet of storage mentioned consists of the small reservoirs in Wyoming above Pathfinder (M.R. p. 49) and obviously does not include the Seminoe which has capacity of 1,026,000 acre feet. The additional sentence may not be entirely necessary, but it serves to clarify the situation and can not be prejudicial to any one.

Explanation of Paragraphs 3 and 4

Paragraphs 3 and 4 may be considered together, since they define the apportionments to Wyoming and Nebraska for use in the Whalen-Tri-State Dam section and of the Kendrick Project. Paragraph 3 limits Wyoming to 405,000 acre feet, which is the sum of 237,000 for the Whalen-Tri-State Dam section and 168,000 for the Kendrick. Heretofore the error in the statement at page 163 of the Master's Report, that the total Wyoming requirement in the Whalen-Tri-State Dam section is 227,000 acre feet, has been explained. This error occurred due to failure to include the Wyoming lands of the Pathfinder Irrigation District, requiring 9,844 acre feet (M.R. p. 86). Addition of this quantity to Wyoming requirements at page 59, comprising 137,500 acre feet for the Goshen Irrigation District, 577 for the Wright and Murphy lands, 46,000 for the Lingle and Hill Districts, and 43,000 for the Wyoming private canals, makes a total of 236,921 acre feet. Deducting the round figure value of 237,000 from the total Whalen-Tri-State Dam May-September requirement of the Master of 1,027,000 acre feet leaves 790,000 for Nebraska. But we contend the Nebraska requirement should be reduced 85,000 acre feet on the basis of the matters set forth under the heading "Requirements in Whalen-Tri-State Dam Section" heretofore. If the Court agrees with our contentions the Nebraska requirement is reduced from 790,000 to 705,000 acre feet. If the Court does not agree, then the quantity in paragraph 4 should be adjusted to conform to whatever conclusions the Court may reach.

Paragraph 3, in accordance with proposal made by the United States and heretofore mentioned under the heading "Allocation for Kendrick Project" provides that irrigation of the Kendrick Project shall not be commenced until storage in the upper reservoirs, plus anticipated in-flow, equals one million acre feet. Reference thereto is made at page 139 of the Master's Report

where it is said that Kendrick irrigation would be postponed, under the United States plan, until storage in Pathfinder, plus anticipated in-flow, equalled one million acre feet. We interpret the proposal to mean that whenever storage in the upper reservoirs, plus anticipated in-flow, equals one million acre feet, irrigation should be commenced. We have not inserted in paragraph 3 any provision as to who shall determine when storage and anticipated in-flow equals one million acre feet, but we assume such determination would be made by the Bureau of Reclamation since it operates the reservoirs. If any insertion is to be made in this connection, we suggest such as will confide this determination to the Bureau.

There is no necessity for a complete supply for the Kendrick project during the first years of development, since it has been constructed in two units and a supply for the first unit will be adequate for the first five years, as no doubt that length of time will be required for subjection of the 35,000 acres in the first unit to cultivation. Therefore, the Wyoming limitation during the first five years after commencement of irrigation of the Kendrick Project, has been specified as 342,000 acre feet, which is the Whalen-Tri-State Dam requirement of 237,000 acre feet, plus 105,000 for the first unit of the Kendrick.

With reference to paragraph 4, the purpose is to enjoin Nebraska from the diversion of more than 705,000 acre feet in the Whalen-Tri-State Dam section during the May-September irrigation season, and also from obtaining the conveyance of any water past Tri-State Dam for diversion at any point below. The latter restriction is based upon the conclusion of the Master (M.R. par. 5, p. 9), that the claim of Nebraska is reduced to that asserted on account of the State Line Canals and the North Platte Project canals, since lands supplied by diversions below Tri-State Dam are satisfied from local sources of supply. The same conclusion is reiterated by the Master at pages 92, 96 and 103 of his report. We believe the injunction we suggest necessary to make the findings and conclusions of the Master in this respect effective. In that connection we again direct the Court's attention to the amount of usable water which passed Tri-State Dam during the 1931-1940 decade, which averaged 81,700 acre feet for the May-September period. (M.R. p. 96.)

The recommendations of the Master comprised in paragraphs 3, 4 and 6 (M. R. pp. 177-179), with reference to the

Whalen-Tri-State Dam section and the Kendrick Project are merely a type of administration between the reservoirs, the Kendrick Project and the State Line Canals, plus a division of natural flow only between Wyoming and Nebraska in the Whalen-Tri-State Dam section. The entire rights of the litigant states are not defined. Particularly is this true, since only the State Line Canals are included in paragraph 3, and the North Platte Project canals comprising the Interstate, Northport and Fort Laramie are omitted. Due to this omission the recommendations will not serve to place a complete limitation upon the use of water by the litigant states.

In paragraphs 3 and 4, we propose that the rights of the states be definitely defined and definite limitations imposed. The necessity for these restrictions is readily apparent when the use of water in the Whalen-Tri-State Dam section for the 1931-1940 decade, as reflected by Tables VII to XIV inclusive at pages 76 to 79 of the Master's Report, is studied. These tables show the diversion of large excess supplies in some years with consequent shortages in others. A comparison of the excesses diverted for the lands in the respective states can be made by adjustment between Wyoming and Nebraska of the excess diversions of the Interstate and Fort Laramie canals, which serve lands in both states. With reference to the Interstate, 46,000 acre feet of the requirement is for the Lingle and Hill Districts, serving lands solely in Wyoming, and of the years when excess diversions were made, 1931 to 1933 inclusive and 1937 and 1938, the Lingle and Hill Districts did not exceed 46,000 acre feet in any year except 1937, as shown by diversions on U.S. exhibit 266, (Appendix p. 70). We ignore the small excess of 159 acre feet in 1932, since diversions in 1331 and 1933 were substantially less than the requirement. Aside from the Lingle and Hill, the total requirement of the Interstate is 419,000 acre feet for 98,000 acres of the Pathfinder Irigation District, with 95,700 acres in Nebraska and 2,300 in Wyoming, and the percentage is 97½ per cent for Nebraska and 2½ for Wyoming. Respective requirements of Nebraska and Wyoming under the Fort Laramie canal, are 147,100 acre feet and 137,500 (M.R. p. 59), and this is reflected in percentage as 52 per cent for Nebraska and 48 for Wyoming. Assuming that lands in the two states enjoyed excess diversions in proportion to the respective requirements of each, the excesses diverted by the Interstate and Fort Laramie canals and of all others in the Whalen-

Tri-State Dam section, as shown in the tables at pages 76 to 79 of the Master's Report are apportioned between Wyoming and Nebraska as follows:

Canal	Year	Acre Feet	Wyoming Acre Feet	Nebraska Acre Feet
Interstate	1931	23,600		
	1932	127,600		
	1933	90,800		
	Total	242,000	6,000 (2½%)	236,000 (97½%)
	1937	29,200		
	1938	25,000		
	Total	54,200		
	1937 excess of Lingle and Hill	900	900	
	Total	53,300	1,300 (2½%)	52,000 (97½%)
Fort Laramie	1932	28,823		
	1933	13,323		
	Total	42,146	20,230 (48%)	21,916 (52%)
Nine Wyoming Private Canals	1932	4,460		
	1933	3,001		
	1934	5,863		
	1935	2,982		
	1936	19,989		
	1937	14,275		
	1938	9,513		
	1939	24,463		
	1940	17,363		
	Total	101,909	101,909	
Mitchell	1931	11,210		
	1932	9,920		
	1933	10,430		
	1937	5,870		
	Total	37,430		37,430
Gering	1931	1,946		
	1932	7,517		
	1933	9,248		
	Total	18,711		18,711

Canal	Year	Acre Feet	Wyoming Acre Feet	Nebraska Acre Feet
Tri-State	1931	62,804		
	1932	81,774		
	1933	32,747		
	1936	50,183		
	1937	33,533		
	1939	24,160		
	Total	285,201		285,201
Ramshorn	1931	1,080		
	1932	1,494		
	1933	1,279		
	Total	3,853		3,853
Northport	1933	22,816		
	1937	8,032		
	1939	2,830		
	Total	33,678		33,678
	TOTAL		130,429	688,789

The foregoing tabulation discloses that in the 1931-1940 decade when excess diversions were made, a total of 130,429 acre feet were diverted for Wyoming, and 688,789 acre feet for Nebraska lands. In addition, Nebraska received water passing Tri-State Dam which, according to the findings and conclusions of the Master, was not required, in an average amount of 81,700 acre feet for the May-September period, or a total of 817,000 acre feet (M.R. p. 96). The total of the excesses to Nebraska in the 10-year period was 1,505,789 acre feet.

To prevent these excess uses which can only result in corresponding shortages, such as occurred in the section in 1934, 1935 and 1940, as disclosed by Table III, page 67 of the Master's Report, the limitations proposed in paragraphs 3 and 4 are absolutely essential. These limitations can not operate to the detriment of either state, as they cover the needs based upon beneficial use. In this connection, our position is that the allotment of 705,000 acre feet to Nebraska serves the requirements of beneficial use, but of course it is 85,000 less than the Master's determinations and, as explained above, this Court must decide as to the correctness of our proposed value or that of the Master, and make whatever adjustment is necessary, if any, to conform to the decision of the court.

These excessive uses caused the shortages of 1934, 1935 and 1940 in the 1931-1940 decade, and if permitted in the future will have the same result, and must, in any event, reduce the amount of carry-over storage, thereby infringing upon the supply of the Kendrick Project. We preceive no argument that can be made by Nebraska against the limitations proposed, as that state will receive such a supply as is requisite for beneficial use, and will be benefitted rather than injured if diversions in each year are confined to the demands of beneficial use, thereby eliminating possibility of shortage in years of low run-off. No argument is needed to sustain the proposition that an adequate supply in all years is preferable to an excessive use in some, with corresponding shortage in others.

Explanation of Paragraph 5

Paragraph 5 is not an indispensable provision of the proposed decree. It has been inserted because of an apparent misunderstanding of the Master as to the Wyoming proposal. As has been said before, there are indications in the Master's Report that the Wyoming plan of mass allocation might in some way interfere with the storage contracts of the North Platte Project and Warren Act contract canals. The North Platte Project contracts contain provisions substantially as follows:

> "The water to be delivered to the District under the provisions of this contract from Pathfinder and Guernsey Reservoirs shall be turned out as ordered by the District * * *."

(See Gering-Fort Laramie contract, N-567, Par. 27; Pathfinder contract N-570, Par. 58; Northport contract N-574, Par. 46; Goshen contract W-11-A, Par. 50). The Warren Act contracts contain delivery schedules which are not set forth in the Master's Report, but to which reference is made by quotation from Article 1 of the Gering contract at page 190. At pages 82 and 83 of the Master's Report, an "ideal" distribution of the May-September supplies for the various months is set forth in percentages and this "ideal" schedule is the one we have used in our paragraph 5. It is not in substantial variance from the delivery schedule of the Warren Act contracts. In any event we say in Paragraph 5, that the supplies shall be delivered in accordance with the needs of the appropriators, and, unless other-

wise requested, delivery should be made in accordance with the ideal schedule. Due to the available reservoir control, no reason is preceived why supplies can not be delivered as requested, or upon the ideal schedule. Of course, all of the contracts take into account that it requires several days for water to reach Whalen from Alcova, and that requests must be made sufficiently in advance of the time the water is desired. These are all primarily matters of administration, and may not need to be covered in the decree, as we think the Court should make a division of the supply, and that administration may be left to the officials who are properly charged therewith.

There is another reason why we have included paragraph 5, and that is because of the Master's claimed rigidity of the Wyoming plan (M.R. p. 118, 120). We are at a loss to understand the reasoning behind such a criticism. What is proposed is the allotment of seasonal quantities to each state, with complete freedom to each in the use of same. How, or in what manner, the Nebraska seasonal quantity is used by that state is of no concern whatever to Wyoming, nor is Wyoming's use of any import to Nebraska. Paragraph 5 demonstrates that the complete flexibility with which supplies may be used when seasonal allotments are made and consideration given to the ability for control of the storage reservoirs.

We believe paragraph 5 may be a useful component of the decree, but it is not one which is necessary, as in the absence thereof it is only reasonable to assume that the water will be delivered in accordance with the needs of the irrigators, and this in turn will conform to the provisions of the contracts relating to delivery.

Explanation of Paragraph 6

Paragraph 6 provides for the distribution of shortages, if any occur, and excesses, between Nebraska and Wyoming in proportion to the respective allotments of paragraphs 3 and 4. Based upon the supply historically occurring 1895 to 1940 inclusive, shortage can not be anticipated because, as developed by the testimony, the run-off of that 46 year period was adequate to meet the requirements of the Kendrick Project and the Whalen-Tri-State Dam section. The only reasonable assumption is that the supply of any future period of equal length will be the same, as the history of natural phenomena tends to repeat itself. However, no one can foresee all that may happen

and there may be some failure in the constructed reservoir works requiring repair, or the emptying of a reservoir other than as required for irrigation use, or unforseeable conditions may arrise, and some provision should be made for distribution of shortages.

It seems to be the purpose of the Master's recommendation to guarantee a complete supply at all times for the Whalen-Tri-State Dam section, or at least for the Nebraska State Line canals. If so, this is not in accord with the principles of this Court announced in Wyoming v. Colorado, 259 U.S. 419, where it is said there is an unalterable need for a supply which is fairly constant and dependable, or susceptible of being made so by storage and conservation within practicable limits. The Court then proceeds:

> "By this it is not meant that known conditions must be such as give assurance that there will be no deficiency even during long periods, but rather that a supply which is likely to be intermittent, or to be materially deficient at relatively short intervals, does not meet the test of practical availability. As we understand it, substantial stability in the supply is essential to successful reclamation and irrigation. The evidence shows that this is so, and it is fully recognized in the literature on the subject." (259 U.S. 480).

The testimony in this case discloses that it is not economically sound to develop irrigation in a stream basin only to such an extent that no shortages in water supply will occur. So to do would limit the area to be irrigated to such as could be furnished a complete supply in the years of most adverse conditions. It is economically sound and practical for development to proceed to the point that some shortage must be tolerated. Supporting these views, the attention of the Court is directed to the testimony of Colorado's witness, Mr. Patterson, at pages 24304, 24305 of the Record, Appendix pages 79 and 80, and of Mr. Dibble, witness for the United States, Record pages 28764, 28765, Appendix pages 80 and 81. Mr. Weiss, a witness for the United States, testified:

"We generally consider a permissible shortage on the average of maybe 30 per cent. In other words, if we can get a seventy per cent secure water supply we consider the irrigation project entirely acceptable." (Record p. 21066).

If a shortage does occur, what is a proper basis of its distribution between Wyoming and Nebraska? In the Laramie River case a mass allocation of 39,750 acre feet was made to Colorado, the upper state, leaving the remainder of the supply to Wyoming (Wyoming v. Colorado, 259 U.S. 419, 309 U.S. 572). The Master has pointed out that Wyoming has not always enjoyed the supply it was thought would be available under the terms of the decree (M.R. p. 269). As between Nebraska and Wyoming this Defendant is the upper state, but we seek no such advantage as may have been accorded to Colorado in the Laramie River case. It appears to us just and equitable that any shortage that may occur should be sustained proportionately by Wyoming and Nebraska, and that is what we propose in paragraph 6.

Under the recommendations propsed by the Master, a complete supply is not guaranteed for any section of the stream above Whalen, because irrigation is primarily on tributaries where the run-off occurs over a very short period of time, and the season in which water may be used is very limited. In the Colorado area the irrigation season is from the middle of May to the middle of July (M.R. p. 43) and in the area above Pathfinder in Wyoming, the season is from 60 to 75 days (M.R. p. 48). While a diversion rate of 2.5 acre feet per acre was found necessary for the use from the main stream between Pathfinder and Whalen, only 2 acre feet per acre was diverted during the 1930-1940 period, although there was no restriction on diversions (M.R. p. 52). Upon the tributaries between Pathfinder and Whalen, the run-off is exhausted before any shortage of water occurs on the main river (M.R. p. 145), and the season is even shorter than above Pathfinder (M.R. p. 52). There is a large mass of evidence upon the character of irrigation from the tributaries at all points above Whalen showing that the irrigation season is very short, and only meager supplies are enjoyed, even upon senior rights. From the main stream itself, above Whalen in Wyoming only 24,400 acre are irrigated; 15,000 between Pathfinder and Whalen and 9,400 above Path-

finder (M.R. pp. 133, 147, 148). The restrictions proposed by the Master above Whalen, confining irrigation to present uses and affecting as they do lands primarily irrigated from the tributaries upon which the run-off occurs over a very short period, and the irrigation season is only 60 to 75 days, will permit the enjoyment of only such supplies as may occur and will not provide a 100 per cent supply. Therefore, if the Whalen-Tri-State Dam section sustains any shortage it will be in no worse position than other sections of the stream above.

Doubt is expressed in the Master's Report as to how a shortage could be pro-rated under the Wyoming plan (M.R. p. 117). From the character of the run-off at Pathfinder, shortage in any season can be readily anticipated somewhat in advance of its actual occurrence. Sheet 2 of Colorado Exhibit 93 shows average run-off at Pathfinder in acre feet monthly for the period 1895 to 1939, and the averages for the May-September months are as follows:

Month	Acre Feet
May	315,490
June	424,220
July	138,960
August	53,110
September	31,870

The large supplies come primarily in May and June, and the small run-off of August and September makes it possible for a fair determination of the seasonal supply to be made not later than August 1st, and perhaps as early as July 1st. The same information as to the character of supply at Pathfinder and its distribution through the May-September months, as is reflected in the values taken from Colorado exhibit 93, supra, is disclosed by the maximum and minimum daily second foot values for the irrigation season months shown at page 84 of the Master's Report. While we think the character of the run-off permits of an adequate anticipation of shortage, nevertheless if no anticipation whatever could be made, shortage must be apparent upon its occurrence and immediately the supply can be distributed to the respective states in accordance with the proposals of our paragraph 6. We do not perceive any reason why shortage will be any less apparent upon its occurrence under the Wyoming plan than under the proposals of the Master. On the other hand, seasonal apportionments, with the storage control available, will

give a far greater freedom in the use of water than such day by day administration as is contemplated by the Master's recommendations for the Whalen-Tri-State Dam section.

There is also in paragraph 6 a provision for the sharing of excesses proportionately to the allotments to Wyoming and Nebraska. In this connection there seems to be some confusion in the Master's Report for, at page 111, it is stated that Wyoming claims there is an invasion of her rights by Nebraska which can be prevented only by an equitable apportionment between the states, and that the rights of the North Platte Project and Nebraska State Line canals must be defined and limited, and that unless this is done excessive diversions will operate unduly to reduce carry-over storage and make for subsequent shortages in supply. Excepting that we do not propose limitations against individual canals, but only such as will affect them by limitations upon the states, this is exactly the Wyoming contention. However, at page 116, it is said that under the Wyoming plan any excess above requirements would presumably be either free water or go to Nebraska for use below the Tri-State Dam. This is exactly the reverse of what this Defendant proposes. We contend that any water above the requirements of the respective states in any year should be retaind in the upper reservoirs and held for use in any succeeding year. Likewise, we contend that instead of this excess water going to Nebraska where it is not needed, it should be retained in the upper reservoirs to assure a supply for succeeding years, and for the Kendrick Project, which has been constructed at great cost and awaits development. In the language of this Court, New Jersey v. New York, 283 U.S. 336, 75 L. Ed. 1104: "A river is more than an amenity, it is a treasure." (283 U.S. 342). That any part of the supply should be wasted by its conveyance to a point where not needed, is abhorrent to all principles of conservation. The plan we propose is designed to prevent transportation of water to points where not needed and to conserve to the utmost the available supply.

In our argument under the heading "Available and Dependable Supply", it was developed that under the study of the Wyoming witness, Mr. Nelson, based upon run-off as it actually occurred, 1904 to 1940, inclusive, and supplying from this production all present needs including the Kendrick Project, and a quantity sufficient to cover the Master's proposed seasonal requirement of 1,027,000 acre feet for the Whalen-Tri-State Dam sec-

tion, reservoir spills occurred in 21 of the 37 years, comprising a total quantity of 9,721,000 acre feet. Under similar conditions of supply, which may be reasonably anticipated because of nature's tendency to repeat itself, there will be uncontrolled supplies, and in paragraph 6 we propose that these may be enjoyed by Wyoming and Nebraska in proportion to the respective allotments of paragraphs 3 and 4. This is not perhaps of great importance because when these spills occur, conditions are such there is not great need for the water. It is a matter upon which no difficulty need be anticipated.

Explanation of Paragraphs 7, 8 and 9

Paragraph 7 is identical with the same numbered paragraph of the Master's recommendations (M.R. p. 179). It may not be necessary but its insertion is not injurious, and we favor its retention.

Paragraph 8 brings into the decree matters mentioned in the third paragraph at page 180 of the Master's Report, which we think should be incorporated. The recommendation has been broadened by including water for stock-watering purposes, and clarified to include diversions from tributaries as well as from the main stream.

Paragraph 9 is the same as paragraph 8 of the Master's recommendations (M.R. p. 179), excepting that we have added a proviso that application for ammendment or modification of the decree shall not be made within ten years from date of same. Under the heading "A Complete Equitable Apportionment Should Be Made", we have endeavored to point out that any decree which is rendered should be complete in itself at the time of rendition, making an entire apportionment as between the litigant states. We do not, however, contend that a decree must necessarily be final, and therefore believe that paragraph 9 should be included. At least in one respect the decree should not have finality, and that is as to possible additional development above Whalen in Wyoming and Colorado. The Wyoming study comprised in Wyoming exhibits 170 to 176 inclusive, it will be recalled, discloses that after supplying all existing needs and the Kendrick Project over the 37 year period, 1904 to 1940, reservoir spills of 9,721,000 acre feet from the upper storage reservoirs occurred. This water in any similar future period of run-off might be put to beneficial use at some point above

Whalen in either Wyoming or Colorado. We limit the area where it may be utilized as designated, for the reason no claim has been made for additional use between Whalen and Kingsley Reservoir in Nebraska, and below Kingsley the supply is undoubtedly adequate for any future development that may occur, and this is in accordance with the findings of the Master. (M.R. pp. 96, 99).

This cause was instituted more than ten years ago. It has been a long and arduous litigation—costly in time and money for the litigants. A new development, the Kendrick Project, awaits a supply and the irrigation of 60,000 acres of land. Under these circumstances there would appear to be no necessity for any attempt at modification of the decree within ten years, and we believe the interest of all litigants will be served by the inclusion of the proviso of paragraph 9 deferring for a decade any application for amendment.

The Proposed Decree Is Equitable

The propriety and equity of the mass allocation proposed in paragraphs 3 and 4 is apparent when a study is made of the rights to be served, priorities and sources of supply in both states. In the Whalen-Tri-State Dam section lands without storage rights in Wyoming comprise 15,359 acres and in Nebraska 15,652, and the respective seasonal requirements in acre feet are 41,027 and 40,737 (M.R. p. 74). All other lands have storage supplies. Very nearly the same amount of acreage in each state is dependent on natural flow only. Consequently there is no inequity in providing an allocation to each State adequate for the needs of the lands in each, dependent upon natural flow only.

Priorities of all canals in the section are shown in Table XVII, pages 86 and 87 of the Master's Report. Bearing in mind that the Tri-State, Gering, the Lingle and Hill Districts, and the 1910 right of the Rock Ranch, have Warren Act contracts entitling them to storage supplies (M.R. p. 190), it appears from said Table XVII that all canals in both states enjoying only natural flow rights have priorities senior to December 6, 1904, which is that of the Pathfinder Reservoir and the North Platte Project, excepting only the French. According to the same table this canal serves 651 acres in Wyoming and 1,025 in Nebraska. Therefore, upon a priority basis, lands enjoying only

natural flow in the Whalen-Tri-State Dam section in each state have priorities senior to that of the North Platte Project, excepting only the French, and the latter has a somewhat larger acreage in Nebraska than Wyoming. While the North Platte Project and Warren Act canals have natural flow rights, they are dependent upon storage supplies under Pathfinder priority of December 6, 1904 to meet their full requirements. Since lands without storage rights in both states require a total seasonal supply of only 81,764 acre feet (M.R. p. 74), the remainder of the May-September requirement of 1,027,000 is for the use of canals supplied wholly or in part under the Pathfinder priority of December 6, 1904. From the priority standpoint, it is equitable that no distinction be made between Wyoming and Nebraska for Whalen-Tri-State dam supplies.

Incorporated in our mass allocation to Wyoming is a supply for the Kendrick Project. As heretofore explained, this is based upon the water supply studies in the case showing an available and dependable supply, adequate to meet the needs of the Whalen-Tri-State Dam section and the Kendrick. There is no water supply study in this case except such as shows the adequacy which we claim. In this connection some explanation may be necessary concerning the Nebraska water supply study mentioned at page 142 of the Master's report, and incorporated in Nebraska exhibit 617. A portion of the heading of that exhibit is,

> "Down-stream requirements — average release 1931, 1932, 1933"
>
> "Whalen to Tri-State Dam river section, May to October 1,145,000 acre feet".

It is explained at pages 26183 and 26438 of the Record that this demand for the Whalen-Tri-State Dam section is the release of 1,145,000 acre feet at Alcova. Therefore, this study is predicated upon a release at Alcova of 118,000 acre feet in excess of the Master's proposed requirement of 1,027,000 acre feet for the irrigation season in the Whalen-Tri-State Dam section. Taking into account average net accretion between Alcova and Whalen of 141,000 acre feet as shown on W-173, (Appendix p 40) Laramie River inflow of 23,230 acre feet, and Whalen to State line net accretion of 63,220 acre feet from Table III, page 67 of the Master's Report, an additional net supply of 227,450 acre feet originates below Alcova. Adding this latter quantity to the proposed release of 1,145,000 provides 1,372,450 acre feet for the

Whalen-Tri-State Dam section, or 345,450 acre feet in excess of the proposed requirement of 1,027,000. It is apparent that a study based upon such excessive demand can have no value in determining ability of run-off to meet actual requirements.

We have discussed the Wyoming study under the heading "Available and Dependable Supply", as well as that of the United States, comprised in U.S. exhibits 267 to 273. The conclusion of Mr. Dibble, who presented the United States study is that there is excess water not reasonably required for the Kendrick project and existing irrigation development which can properly be used on new development on the North Platte River (Record pp. 28764, 28765, Appendix, pp. 80-81).

Such effect as was given priorities in Wyoming v. Colorado, 259 U.S. 419, was by mass allocation. The same effect should be given in this case. The recommendations of the Master for Colorado and the area above Guernsey in Wyoming, exclusive of the Kendrick Project, comprise a form of mass allocation. No departure can or should be made from that principle as regards the Whalen-Tri-State Dam and Kendrick apportionments. The Laramie-Poudre tunnel was the junior project in the Laramie River case and was accorded a supply, incorporated in the Colorado apportionment. Likewise here, Wyoming should be given an allotment for the needs of the Kendrick Project. We agree fully with the Master's conclusion that the equities of the states should not be measured solely on the basis of priorities (M.R. p. 112), but the decree we propose gives the same recognition to priorities as was accorded in Wyoming v. Colorado.

Proposed Decree Is One Solely Between States

At page 160 of the Master's Report, it is said that Wyoming feels a limitation should be placed upon the Nebraska State Line canals but that from a legal standpoint, jurisdiction of the Court is doubted to fix limitations upon individual canals. Then follows a statement that the equitable rights of the states must be determined and the requirements of individual appropriators is only one of the elements in the ascertainment of each state's equitable share, and the Master proceeds to say that the Court ought not undertake to define the rights of individual appropriators between each other or between them, and their state, or to determine what portion of the state's share must be allocated to any appropriator or group of appropriators, or to place a limit upon the participation of any appropriator or group in

an allocation to a state. We agree with all these conclusions excepting that an error occurs in the initial statement that Wyoming proposed a limitation upon individual canals of the Nebraska State Line group. Very clearly, at page 400 of our Brief before the Master, we said: "This supply for the State Line canals should be a mass allocation, subject to control, jurisdiction and administration by Nebraska officials". Wyoming then and now advocates an allocation to each state and a limitation upon each state, and not a decree fixing the rights of any individual canal or project. Contrary to the principles announced at pages 160 and 161 of the Master's Report, the recommendations of paragraphs 3 and 4, pages 177 to 178 inclusive, purport to fix the rights of individual canals of the State Line group, as well as of the storage reservoirs. Under our proposed decree, a limitation upon any canal is only such as may result from the limitation upon the state, and complete freedom of administration in each state is allowed. In this respect our proposals are in full accord with the conclusion of the Master that plenary administrative control exists in the states (M.R. p. 175), and the pronouncements of this Court that each state has control of the water within its borders for irrigation purposes. In California Oregon Power Company v. Beaver Portland Cement Company, 295 U.S. 142, 79 L. Ed. 1356, this Court said:

> "What we hold is that following the act of 1877, if not before, all non-navigable waters then a part of the public domain became publici juris, subject to the plenary control of the designated states, including those since created out of the territories named, with the right in each to determine for itself to what extent the rule of appropriation or the common-law rule in respect of riparian rights should obtain." (295 U.S. 163, 164.)

An almost identical expression appears in Brush v. Commissioner, 300 U.S. 352, 81 L. Ed. 691 (300 U.S. 367).

The subject is thoroughly discussed in Kansas v. Colorado, 206 U.S., 46 (pp. 87 to 95 inclusive), and the conclusion stated that for the purposes of that case each state had full jurisdiction of the lands within its borders, including the beds of streams and other waters.

As was said in Kansas v. Colorado, 206 U.S. 46 at page 100, in this cause the controversy arises above a mere question of local private right and involves a matter of state interest and must

be considered from that standpoint. The conclusion is inescapable that the Court should fix the relative rights of the states upon principles applicable in similar causes, and this, our proposed decree will accomplish. It cannot result from the recommendations of the Master relating to the Whalen-Tri-State Dam section and the Kendrick Project, since they deal with individual rights.

Some of the basic findings and conclusions of the Master may be reviewed as follows:

1. Mass allocation of natural flow in the Whalen-Tri-State Dam section can not be made because of lack of evidence as to the volume thereof (M.R. p. 150), and because the evidence as to what is the natural flow fund in the section is not definite and complete (M.R. pp. 162, 163).

2. The evidence is convincing that, given the 1895-1939 average conditions of supply, water can be conserved for the Kendrick Project with a considerable return flow representing net seasonal gain to the river below Alcova (M.R. p. 143), and that by the pooling of natural flow and storage water, accompanied by strict regulation of distribution, the needs of the Kendrick Project can be supplied (M.R. pp. 66, 67).

3. The imposition of an interstate priority schedule for the Whalen-Tri-State Dam section is objectionable because it would deprive each state of full freedom of intrastate administration; would indirectly fix a limitation upon each individual appropriator, and would determine the position and rights of appropriators in relation to each other; this would be a very different matter from a determination of each state's equitable share, and would burden the decree with administrative detail beyond what is necessary, (M.R. p. 149).

Notwithstanding these findings and conclusions, the Master recommends a type of mass allocation of natural flow in the Whalen-Tri-State Dam section (M.R. par. 6, p. 179), and a form of interstate administration in paragraphs 3 and 4 (M.R. pp. 177, 178), and prohibits the joint operation of the storage reservoirs. The Decree we propose is consistent with and does not violate any of these basic findings and conclusions of the Master. It is the only kind of judgment which may properly be entered in ac-

cordance with these findings and conclusions, and in conformity with the decision of this Court in Wyoming v. Colorado, 259 U.S. 419.

Respectfully submitted,

LOUIS J. O'MARR,
Attorney General,
Cheyenne, Wyoming.

W. J. WEHRLI,
Special Counsel,
Casper, Wyoming.

January 29th, 1945.

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IN THE

Supreme Court of the United States

No. 6 Original

THE STATE OF NEBRASKA,
Complainant,

vs.

THE STATE OF WYOMING,
Defendant,

THE STATE OF COLORADO,
Impleaded Defendant,

UNITED STATES OF AMERICA,
Intervener.

APPENDIX TO WYOMING BRIEF

DATA FROM ENGINEERS' STIPULATION, PAGES 5 and 6, CONCERNING RESERVOIRS.

Seminoe Reservoir

Capacity.....1,026,000 acre feet
Operation commenced April 1939 (Nebr. Ex. 602)

Pathfinder Reservoir

Capacity.....1,045,000 acre feet
Operation commenced April 1909 (Colo. Ex. 99)

Alcova Reservoir

Capacity.....190,000 acre feet
Operations commenced Feb. 1938 (Nebr. Ex. 602)

WYOMING EXHIBIT NO. 176
Elmer K. Nelson, C. E.
1941

Sheet 1

NORTH PLATTE RIVER IRRIGATION DEMANDS

ANALYSIS OF RUN-OFF ADJUSTED TO FUTURE USES, WITH STORAGE IN SEMINOE, PATHFINDER AND ALCOVA RESERVOIRS.

Notes on Wyoming Exhibit No. 176

Col. 1 Wyoming Exhibit 100 adjusted to future development above Pathfinder Reservoir. Adjustments of previous exhibit.

Col. 2 Storage in Reservoirs at beginning of month or period.

Col. 3 Storage in Reservoirs at end of month or period.

Col. 4 Required Discharges at Reservoirs, sum of values in Cols. 7 and 8.

Col. 5 Computed Reservoir Evaporation losses. For 1904-1918; Data from Colo. Ex. 78; Pathfinder station mean adjusted with relation to Ft. Collins, Colo. station. Monthly distribution average. For 1914-1940; Pathfinder station evaporation records applied to mean monthly water surface of Reservoirs. See Colo. Ex. 78 or Nebr. Exs.

Col. 6 Spills based upon a total storage in Reservoirs as follows:

Seminoe	1,024.0
Pathfinder	1,045.0
Alcova	180.0 mean,
Total	2,249.0 M. Ac. Ft.

When Storage declines to 160.0, Kendrick Project cannot divert water.

Col. 7 Demand for Kendrick Project. Previous Exhibit.

Col. 8 Demand at the Whalen—Tri-State Dam Section upon runoff originating above Pathfinder. Col. B, companion exhibit.

Note: Private Ditches on River between Pathfinder and Guernsey assumed in status quo. Run-off values are net with such uses in operation.

WYOMING EXHIBIT NO. 176

Sheet 2

NORTH PLATTE RIVER
IRRIGATION DEMANDS

ANALYSIS OF RUN-OFF ADJUSTED TO FUTURE USES, WITH STORAGE IN SEMINOE, PATHFINDER AND ALCOVA RESERVOIRS

Thousands Acre Feet

Period	1 Run-off	2 Storage Beg.	3 Storage End	4 Required Disch.	5 Res.' Losses	6 Spills	7 Demand Kendrick Proj.	8 Demand Whalen to Tri-State Dam
				1904				
Oct.-Apr.	365.0	.0	355.0	10.0	.0	.0	.0	.0
May	328.5	355.0	581.5	98.9	3.1	.0	24.0	74.9
June	326.0	581.5	811.8	89.4	6.3	.0	36.0	53.4
July	47.0	811.8	636.6	215.0	7.2	.0	51.0	164.0
Aug.	22.3	636.6	457.1	216.7	5.1	.0	33.0	183.7
Sept.	30.2	457.1	352.0	112.0	3.3	.0	24.0	88.0
May-Sept.	754.0			732.0	25.0	.0	168.0	564.0
Year	1119.0			742.0				
				1905				
Oct.-Apr.	247.0	352.0	589.9	10.0	.0	.0	.0	.0
May	229.5	589.9	791.1	24.0	4.3	.0	24.0	.0
June	449.0	791.1	1095.8	136.3	8.0	.0	36.0	100.3
July	46.0	1095.8	947.1	185.0	9.7	.0	51.0	134.0
Aug.	23.2	947.1	765.3	197.6	7.4	.0	33.0	164.6
Sept.	21.3	765.3	671.9	109.9	5.3	.0	24.0	85.9
May-Sept.	769.5			652.8	34.7	.0	168.0	484.8
Year	1017.4			662.8				

WYOMING EXHIBIT NO. 176

Sheet 3

NORTH PLATTE RIVER
IRRIGATION DEMANDS AND STORAGE USE

Thousands Acre Feet

Period	1 Run-off	2 Storage Beg.	3 Storage End	4 Required Disch.	5 Res.' Losses	6 Spills	7 Demand Kendrick Proj.	8 Demand Whalen to Tri-State Dam
				1906				
Oct.-Apr.	349.5	671.9	1011.4	10.0	.0	.0	.0	.0
May	346.5	1011.4	1266.4	84.9	6.6	.0	24.0	60.9
June	365.0	1266.4	1478.0	146.9	6.5	.0	36.0	110.9
July	75.0	1478.0	1346.6	199.0	7.4	.0	51.0	148.0
Aug.	27.5	1346.6	1180.7	182.9	10.5	.0	33.0	149.9
Sept.	46.5	1180.7	1161.8	117.3	8.1	.0	24.0	93.3
May-Sept.	860.5			731.0	39.1	.0	168.0	563.0
Year	1210.0			741.0				
				1907				
Oct.-Apr.	474.4	1101.8	1566.2	10.0	.0	.0	.0	.0
May	276.4	1566.2	1804.5	26.9	11.2	.0	24.0	2.9
June	525.5	1804.5	2246.9	63.9	19.2	.0	36.0	27.9
July	290.7	2246.9	2249.0	184.0	24.6	80.0	51.0	183.0
Aug.	67.2	2249.0	2099.7	195.7	20.8	.0	33.0	162.7
Sept.	44.1	2099.7	2036.1	93.6	14.1	.0	24.0	69.6
May-Sept	1203.9			564.1	89.9	80.0	168.0	396.1
Year	1678.3			574.1				

WYOMING EXHIBIT NO. 176

Sheet 4

NORTH PLATTE RIVER
IRRIGATION DEMANDS AND STORAGE USE

Thousands Acre Feet

Period	1 Run-off	2 Storage Beg.	3 Storage End	4 Required Diversion	5 Res. Losses	6 Spills	7 Demand Kendrick Proj.	8 Demand Whalen to Tri-State Dam
				1968				
Oct-April	317.1	2036.1	2249.0	10.0	.0	94.2	.0	.0
May	116.6	2249.0	2249.0	24.6	13.4	79.2	24.0	.0
June	213.5	2249.0	2249.0	36.0	19.7	157.8	36.0	.0
July	77.3	2249.0	2041.9	263.0	21.4	.0	51.0	212.0
Aug.	65.0	2041.9	1865.3	228.6	13.0	.0	33.0	195.6
Sept.	87.3	1865.3	1775.7	115.4	11.5	.0	24.0	91.4
May-Sept.	509.7			667.0	79.0	237.0	168.0	499.0
Year	826.8			677.0		331.2		
				1969				
Oct.-April	356.6	1775.7	2122.3	10.0	.0	.0	.0	.0
May	416.4	2122.3	2249.0	66.9	12.5	210.3	24.0	42.9
June	934.5	2249.0	2249.0	69.9	18.3	846.3	36.0	33.9
July	327.7	2249.0	2233.3	324.0	19.4	.0	51.0	273.0
Aug.	86.4	2233.3	2070.2	231.9	17.6	.0	33.0	198.9
Sept.	80.0	2070.2	2013.7	122.8	13.7	.0	24.0	98.8
May-Sept	1845.0			815.5	81.5	1056.6	168.0	647.5
Year	2201.6			825.5				

WYOMING EXHIBIT NO. 176

Sheet 5

NORTH PLATTE RIVER
IRRIGATION DEMANDS AND STORAGE USE

Thousands Acre Feet

Period	1 Run-off	2 Storage Beg.	3 Storage End	4 Required Disch.	5 Res. Losses	6 Spills	7 Demand Kendrick Proj.	8 Demand Whalen to Tri-State Dam
1910								
Oct.-Apr.	445.1	2013.7	2249.0	10.0	.0	209.8	.0	.0
May	225.6	2249.0	2249.0	89.9	13.0	122.7	24.0	65.9
June	138.5	2249.0	2099.7	264.9	22.9	.0	36.0	228.9
July	14.5	2099.7	1810.4	281.0	22.8	.0	51.0	230.0
Aug.	16.5	1810.4	1537.0	235.9	18.0	.0	33.0	202.9
Sept.	27.2	1573.0	1467.8	120.8	11.6	.0	24.0	96.0
May-Sept.	422.3			992.5	88.3	122.7	168.0	824.5
Year	877.4			1002.5		332.5		
1911								
Oct.-Apr.	345.1	1467.8	1802.9	10.0	.0	.0	.0	.0
May	236.5	1802.9	1940.8	84.0	14.6	.0	24.0	60.0
June	338.0	1940.8	2018.4	237.0	22.5	.0	36.0	201.9
July	21.9	2018.4	1735.1	281.0	24.2	.0	51.0	230.0
Aug.	15.7	1735.1	1503.5	225.9	21.4	.0	33.0	192.9
Sept.	26.8	1503.5	1400.8	115.8	13.7	.0	24.0	91.8
May-Sept.	638.9			944.6	96.4	.0	168.0	776.6
Year	984.0			954.6				

WYOMING EXHIBIT NO. 176

Sheet 6

NORTH PLATTE RIVER
IRRIGATION DEMANDS AND STORAGE USE

Thousands Acre Feet

Period	1 Run-off	2 Storage Beg.	3 Storage End	4 Required Disch.	5 R.s.' Losses	6 Spills'	7 Demand Kendrick Proj.	8 Demand Whalen to Tri-State Dam
				1912				
Oct.-Apr.	392.3	1400.8	1783.1	10.0	.0	.0	.0	.0
May	343.4	1783.1	2089.4	24.0	13.1	.0	24.0	.0
June	550.5	2089.4	2249.0	243.9	22.4	124.6	36.0	207.9
July	197.7	2249.0	2111.7	310.0	25.0	.0	51.0	259.0
Aug.	96.4	2111.7	1945.6	241.9	20.6	.0	33.0	208.9
Sept.	82.4	1945.6	1898.0	115.8	14.2	.0	24.0	91.8
May-Sept.	1270.4			935.6	95.3	124.6	168.0	767.6
Year	1662.7			945.6				
				1913				
Oct.-Apr.	618.5	1898.0	2249.0	10.0	.0	257.5	.0	.0
May	294.5	2249.0	2249.0	98.9	14.8	180.8	24.0	74.9
June	190.0	2249.0	2169.0	248.9	21.1	.0	36.0	212.9
July	3.3	2169.0	1868.2	282.0	22.1	.0	51.0	251.0
Aug.	19.6	1868.2	1636.0	234.9	16.9	.0	33.0	201.9
Sept.	30.4	1636.0	1542.1	112.8	11.5	.0	24.0	88.8
May-Sept.	537.8			977.5	86.4	180.8	168.0	809.5
Year	1156.3			987.5		438.3		

WYOMING EXHIBIT NO. 176

Sheet 7

NORTH PLATTE RIVER
IRRIGATION DEMANDS AND STORAGE USE

Thousands Acre Feet

Period	1 Run-off	2 Storage Beg.	3 Storage End	4 Required Disch.	5 Res.' Losses	6 Spills	7 Demand Kendrick Proj.	8 Demand Whalen to Tri-State Dam
				1914				
Oct.-Apr.	429.2	1542.1	1961.3	10.0	.0	.0	.0	.0
May	415.5	1961.3	2249.0	49.9	19.6	58.3	24.0	25.9
June	456.0	2249.0	2249.0	256.9	26.8	172.3	36.0	220.9
July	50.0	2249.0	1978.6	291.0	29.4	.0	51.0	240.0
Aug.	47.6	1978.6	1763.8	283.9	23.5	.0	33.0	205.9
Sept.	36.6	1763.8	1660.0	122.8	17.6	.0	24.0	98.8
May-Sept.	1005.7			959.5	116.9	230.6	168.0	791.5
Year	1434.9			969.5				
				1915				
Oct.-Apr.	343.4	1660.0	1993.4	10.0	.0	.0	.0	.0
May	144.6	1993.4	2083.2	40.6	14.2	.0	24.0	16.6
June	197.5	2083.2	2068.0	192.9	19.8	.0	36.0	156.9
July	36.7	2068.0	1803.4	279.0	22.3	.0	51.0	228.0
Aug.	40.7	1803.4	1618.4	207.9	17.8	.0	33.0	174.9
Sept.	59.1	1618.4	1625.3	39.8	12.4	.0	24.0	15.8
May-Sept.	478.6			760.2	86.5	.0	168.0	592.2
Year	822.0			770.2				

WYOMING EXHIBIT NO. 176

Sheet 3

NORTH PLATTE RIVER
IRRIGATION DEMANDS AND STORAGE USE

Thousands Acre Feet

Period	1 Run-off	2 Storage Beg.	3 Storage End	4 Required Disch.	5 Res.' Losses	6 Spills	7 Demand Kendrick Proj.	8 Demand Whalen to Tri-State Dam
				1916				
Oct.-Apr...	455.9	1625.3	2071.2	10.0	.0	.0	.0	.0
May	268.5	2071.2	2232.8	91.9	15.0	.0	24.0	67.9
June	268.0	2232.8	2215.5	258.9	26.4	.0	36.0	222.9
July	53.0	2215.5	1950.2	288.0	30.3	.0	51.0	237.0
Aug.	43.5	1950.2	1754.0	217.9	21.8	.0	33.0	184.9
Sept.	45.1	1754.0	1671.1	109.8	18.2	.0	24.0	85.8
May-Sept.	678.1			966.5	111.7	.0	168.0	798.5
Year	1134.0			976.5				
				1917				
Oct.-Apr.	504.2	1671.1	2165.3	10.0	.0	.0	.0	.0
May	423.4	2165.3	2249.0	24.0	17.4	298.3	24.0	.0
June	821.5	2249.0	2249.0	128.9	24.2	668.4	36.0	92.9
July	387.7	2249.0	2249.0	223.0	32.2	132.5	51.0	172.0
Aug.	67.5	2249.0	2068.0	221.9	26.6	.0	33.0	188.9
Sept.	57.3	2068.0	2005.0	102.8	17.5	.0	24.0	78.8
May-Sept.	1757.4			700.6	117.9	1099.2	168.0	532.6
Year	2261.6			710.6				

WYOMING EXHIBIT NO. 176

Sheet 9

NORTH PLATTE RIVER
IRRIGATION DEMANDS AND STORAGE USE

Thousands Acre Feet

Period	1 Run-off	2 Storage Beg.	3 Storage End	4 Required Disch.	5 Res. Losses	6 Spills	7 Demand Kendrick Proj.	8 Demand Whalen to Tri-State Dam
				1918				
Oct.-Apr...	405.0	2005.0	2249.0	10.0	.0	151.0	.0	.0
May	304.5	2249.0	2249.0	24.0	17.9	262.6	24.0	.0
June	547.0	2249.0	2249.0	198.0	24.2	323.9	36.0	162.9
July	74.0	2249.0	2093.0	205.0	25.0	.0	51.0	154.0
Aug.	26.7	2093.0	1928.7	165.9	25.1	.0	33.0	132.9
Sept.	39.2	1928.7	1893.0	60.8	14.1	.0	24.0	36.8
May-Sept.	991.4			654.6	106.3	586.5	168.0	486.6
Year	1396.4			664.6		737.5		
				1919				
Oct.-Apr.	386.9	1893.0	2249.0	10.0	.0	20.9	.0	.0
May	224.6	2249.0	2249.0	129.9	23.7	91.0	24.0	105.9
June	143.5	2249.0	2117.8	247.9	26.8	.0	36.0	211.9
July	15.0	2117.8	1831.0	273.0	28.8	.0	51.0	222.0
Aug.	15.0	1831.0	1608.1	216.9	21.0	.0	33.0	183.9
Sept.	16.4	1608.1	1492.5	119.8	12.2	.0	24.0	95.8
May-Sept.	434.5			987.5	112.5	91.0	168.0	819.5
Year	821.4			997.5		119.9		

WYOMING EXHIBIT NO. 176

Sheet 10

NORTH PLATTE RIVER
IRRIGATION DEMANDS AND STORAGE USE

Thousands Acre Feet

Period	1 Run-off	2 Storage Beg.	3 Storage End	4 Required Diech.	5 Res. Losses	6 Spills	7 Demand Kendrick Proj.	8 Demand Whalen to Tri-State Dam
				1920				
Oct.-Apr.	387.0	1492.5	1869.5	10.0	.0	.0	.0	.0
May	542.4	1869.5	2249.0	24.0	9.6	129.3	24.0	.0
June	594.5	2249.0	2249.0	253.9	23.0	317.6	36.0	217.9
July	104.7	2249.0	2080.9	247.0	25.8	.0	51.0	196.0
Aug.	55.0	2080.9	1907.9	208.9	19.1	.0	33.0	175.9
Sept.	46.3	1907.9	1859.3	79.8	15.1	.0	24.0	55.8
May-Sept.	1342.9			813.6	92.6	446.9	168.0	645.6
Year	1729.9			823.6				
				1921				
Oct.-Apr.	406.3	1859.3	2249.0	10.0	.0	6.9	.0	.0
May	866.4	2249.0	2249.0	36.9	16.5	313.0	24.0	12.9
June	689.5	2249.0	2249.0	277.9	23.7	387.9	36.0	241.9
July	98.7	2249.0	2055.9	267.0	24.8	.0	51.0	216.0
Aug.	67.9	2055.9	1881.1	223.9	18.8	.0	33.0	190.9
Sept.	89.4	1881.1	1783.6	120.8	16.1	.0	24.0	96.8
May-Sept.	1261.9			926.5	99.9	700.9	168.0	758.5
Year	1668.5			936.5		707.8		

WYOMING EXHIBIT NO. 176

Sheet 11

NORTH PLATTE RIVER
IRRIGATION DEMANDS AND STORAGE USE

Thousands Acre Feet

Period	1 Run-off	2 Storage Beg.	3 Storage End	4 Required Disch.	5 Res. Losses	6 Spills	7 Demand Kendrick Proj.	8 Demand Whalen to Tri-State Dam
				1922				
Oct.-Apr.	371.4	1783.5	2145.0	10.0	.0	.0	.0	.0
May	317.5	2145.0	2249.0	29.9	16.5	167.1	24.0	5.9
June	337.0	2249.0	2249.0	233.9	24.2	78.9	36.0	197.9
July	14.6	2249.0	1955.4	284.0	24.2	.0	51.0	233.0
Aug.	14.0	1955.4	1723.8	224.9	20.7	.0	33.0	191.9
Sept.	17.0	1723.8	1618.9	106.8	15.1	.0	24.0	82.8
May-Sept.	700.1			879.5	100.7	246.0	168.0	711.5
Year	1071.5			889.5				
				1923				
Oct.-Apr.	326.4	1618.9	1935.3	10.0	.0	.0	.0	.0
May	347.5	1935.3	2243.8	24.0	15.9	.0	24.0	.0
June	492.0	2243.8	2249.0	209.9	25.0	251.9	36.0	173.9
July	153.0	2249.0	2130.3	252.0	19.7	.0	51.0	201.0
Aug.	41.0	2130.3	1944.4	201.9	25.0	.0	33.0	168.9
Sept.	54.9	1944.4	1938.3	45.8	15.2	.0	24.0	21.8
May-Sept.	1088.4			733.6	99.9	251.9	168.0	565.6
Year	1414.8			743.6				

WYOMING EXHIBIT NO. 176

Sheet 12

NORTH PLATTE RIVER
IRRIGATION DEMANDS AND STORAGE USE

Thousands Acre Feet

Period	1 Run-off	2 Storage Beg.	3 Storage End	4 Required Disch.	5 Res.' Losses	6 Spills	7 Demand Kendrick Proj.	8 Demand Whalen to Tri-State Dam
				1924				
Oct.-Apr.	648.7	1938.3	2249.0	10.0	.0	328.0	.0	.0
May	337.5	2249.0	2249.0	24.0	13.0	300.5	24.0	.0
June	349.0	2249.0	2249.0	223.9	25.0	100.1	36.0	187.9
July	37.5	2249.0	1956.5	304.0	26.0	.0	51.0	253.0
Aug.	15.7	1956.5	1693.5	261.9	16.8	.0	33.0	228.9
Sept.	17.5	1693.5	1603.2	98.8	9.0	.0	24.0	74.8
May-Sept.	757.2			912.6	89.8	400.6	168.0	744.6
Year	1405.9			922.6		728.6		
				1925				
Oct.-Apr.	470.5	1603.2	2063.7	10.0	.0	.0	.0	.0
May	237.5	2063.7	2212.3	71.9	17.0	.0	24.0	47.9
June	259.0	2212.3	2218.3	231.9	21.1	.0	36.0	195.9
July	84.0	2218.3	1980.1	298.0	24.2	.0	51.0	247.0
Aug.	49.2	1980.1	1774.0	235.9	19.4	.0	33.0	202.9
Sept.	62.5	1774.0	1731.2	92.8	12.5	.0	24.0	68.8
May-Sept.	692.2			930.5	94.2	.0	168.0	762.5
Year	1162.7			940.5				

WYOMING EXHIBIT NO. 176

Sheet 13

NORTH PLATTE RIVER
IRRIGATION DEMANDS AND STORAGE USE

Thousands Acre Feet

Period	1 Run-off	2 Storage Beg.	3 Storage End	4 Required Disch.	5 Res. Losses	6 Spills	7 Demand Kendrick Proj.	8 Demand Whalen to Tri-State Dam
				1926				
Oct.-Apr.	693.6	1731.2	2249.0	10.0	.0	165.8	.0	.0
May	419.4	2249.0	2249.0	54.9	17.9	346.6	24.0	30.9
June	339.5	2249.0	2249.0	233.9	21.5	84.1	36.0	197.9
July	123.7	2249.0	2073.7	277.0	22.0	.0	51.0	226.0
Aug.	50.6	2073.7	1852.4	249.9	22.0	.0	33.0	216.9
Sept.	35.9	1852.4	1762.8	112.8	12.7	.0	24.0	88.8
May-Sept.	969.1			928.5	96.1	430.7	168.0	760.5
Year	1662.7			938.5		596.5		
				1927				
Oct.-Apr.	405.4	1762.8	2158.2	10.0	.0	.0	.0	.0
May	410.5	2158.2	2249.0	24.0	19.7	276.0	24.0	.0
June	364.0	2249.0	2249.0	244.9	21.0	98.1	36.0	208.9
July	89.0	2249.0	2020.9	293.0	24.1	.0	51.0	242.0
Aug.	67.6	2020.9	1853.2	217.9	17.4	.0	33.0	184.9
Sept.	53.0	1853.2	1794.9	97.8	13.5	.0	24.0	73.8
May-Sept.	984.1			877.6	95.7	374.1	168.0	709.6
Year	1389.5			887.6				

WYOMING EXHIBIT NO. 176

Sheet 14

NORTH PLATTE RIVER
IRRIGATION DEMANDS AND STORAGE USE

Thousands Acre Feet

Period	1 Run-off	2 Storage Beg.	3 Storage End	4 Required Disch.	5 Res. Losses	6 Spills	7 Demand Kendrick Proj.	8 Demand Whalen to Tri-State Dam
1928								
Oct.-Apr.	514.1	1794.9	2249.0	10.0	.0	50.0	.0	.0
May	547.4	2249.0	2249.0	42.0	14.7	490.7	24.0	18.0
June	382.5	2249.0	2249.0	169.9	17.4	195.2	36.0	133.9
July	85.7	2249.0	2041.8	272.5	20.4	.0	51.0	221.5
Aug.	47.3	2041.8	1834.1	233.8	21.2	.0	33.0	200.8
Sept.	38.6	1834.1	1755.2	105.3	12.2	.0	24.0	81.3
May-Sept.	1101.5			823.5	85.9	685.9	168.0	655.5
Year	1615.6			833.5		735.9		
1929								
Oct.-Apr.	539.9	1755.2	2249.0	10.0	.0	36.1	.0	.0
May	446.4	2249.0	2249.0	24.0	17.0	405.4	24.0	.0
June	537.5	2249.0	2249.0	175.4	22.8	339.3	36.0	139.4
July	144.7	2249.0	2071.9	296.4	25.4	.0	51.0	245.4
Aug.	58.7	2071.9	1872.2	287.0	21.4	.0	33.0	204.0
Sept.	78.0	1872.2	1832.9	109.6	7.7	.0	24.0	85.6
May-Sept.	1265.3			842.4	94.3	744.7	168.0	674.4
Year	1805.2			852.4		780.8		

Sheet 15

NORTH PLATTE RIVER
IRRIGATION DEMANDS AND STORAGE USE

Thousands Acre Feet

Period	1 Run-off	2 Storage Beg.	3 Storage End	4 Required Disch.	5 Res. Losses	6 Spills	7 Demand Kendrick Proj.	8 Demand Whalen to Tri-State Dam
				1930				
Oct.-Apr.	541.1	1832.9	2249.0	10.0	0.	115.0	.0	.0
May	169.5	2249.0	2249.0	63.8	14.7	91.0	24.0	39.8
June	174.0	2249.0	2133.5	266.5	23.0	.0	36.0	230.5
July	7.0	2133.5	1826.8	289.2	24.5	.0	51.0	238.2
Aug.	82.0	1826.8	1701.0	193.7	14.1	.0	33.0	160.7
Sept.	35.5	1701.0	1632.6	93.2	10.7	.0	24.0	69.2
May-Sept.	468.0			906.4	87.0	91.0	168.0	738.5
Year	1009.1			916.4		206.0		
				1931				
Oct.-Apr.	363.6	1632.6	1986.2	10.0	.0	.0	.0	.0
May	139.6	1986.2	2002.3	108.0	15.5	.0	24.0	84.0
June	139.5	2002.3	1887.0	232.8	22.0	.0	36.0	196.8
July	15.0	1887.0	1602.7	273.9	25.4	.0	51.0	222.9
Aug.	15.0	1602.7	1413.2	187.2	17.3	.0	33.0	154.2
Sept.	21.7	1413.2	1316.3	103.7	14.9	.0	24.0	79.7
May-Sept.	330.8			905.5	95.1	.0	168.0	737.5
Year	694.4			915.5				

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Sheet 16

NORTH PLATTE RIVER
IRRIGATION DEMANDS AND STORAGE USE

Thousands Acre Feet

Period	1 Run-off	2 Storage Beg.	3 Storage End	4 Required Disch.	5 Res.' Losses	6 Spills	7 Demand Kendrick Proj.	8 Demand Whalen to Tri-State Dam
				1932				
Oct.-Apr.	422.0	1316.3	1728.3	10.0	.0	.0	.0	.0
May	445.5	1728.3	2113.2	47.1	13.5	.0	24.0	23.1
June	390.0	2113.2	2218.8	262.4	22.0	.0	36.0	226.4
July	112.0	2218.8	2002.5	297.6	30.7	.0	51.0	246.6
Aug.	28.5	2002.5	1782.5	223.5	25.0	.0	33.0	190.5
Sept.	22.2	1782.5	1684.9	104.2	15.6	.0	24.0	80.2
May-Sept.	998.2			934.7	106.8	.0	168.0	766.7
Year	1420.2			944.7				
				1933				
Oct.-Apr.	319.2	1684.9	1994.1	10.0	.0	.0	.0	.0
May	211.5	1994.1	2165.8	24.0	15.8	.0	24.0	.0
June	468.0	2165.8	2249.0	257.9	30.8	96.1	36.0	221.9
July	26.3	2249.0	1964.0	279.8	31.5	.0	51.0	228.8
Aug.	11.5	1964.0	1748.2	206.9	20.4	.0	33.0	173.9
Sept.	38.0	1748.2	1673.4	94.2	18.6	.0	24.0	70.2
May-Sept.	755.3			862.8	117.1	96.1	168.0	694.8
Year	1074.5			872.9				

WYOMING EXHIBIT NO. 176

Sheet 17

NORTH PLATTE RIVER
IRRIGATION DEMANDS AND STORAGE USE

Thousands Acre Feet

Period	1 Run-off	2 Storage Beg.	3 Storage End	4 Required Disch.	5 Res. Losses	6 Spills	7 Demand Kendrick Proj.	8 Demand Whalen to Tri-State Dam
				1934				
Oct.-Apr.	287.6	1673.4	1951.0	10.0	.0	.0	.0	.0
May	76.4	1951.0	1838.8	166.6	22.0	.0	24.0	142.6
June	15.0	1838.8	1613.4	218.6	21.8	.0	36.0	182.6
July	10.0	1613.4	1301.0	300.6	21.8	.0	51.0	249.6
Aug.	10.0	1301.0	1081.7	213.1	16.2	.0	33.0	180.1
Sept.	10.7	1081.7	970.6	114.0	7.8	.0	24.0	90.0
May-Sept.	122.1			1012.9	89.6	.0	168.0	844.9
Year	409.7			1022.9				
				1935				
Oct.-Apr.	179.6	970.6	1140.2	10.0	.0	.0	.0	.0
May	81.8	1140.2	1162.0	37.0	23.0	.0	24.0	13.0
June	316.5	1162.0	1276.6	188.9	13.0	.0	36.0	152.9
July	34.6	1276.6	1001.5	292.4	17.3	.0	51.0	241.4
Aug.	13.8	1001.5	774.6	228.8	11.9	.0	33.0	195.8
Sept.	17.4	774.6	694.1	92.1	5.8	.0	24.0	68.1
May-Sept	464.1			839.2	71.0	.0	168.0	671.2
Year	643.7			849.2				

WYOMING EXHIBIT NO. 176

Sheet 18

NORTH PLATTE RIVER
IRRIGATION DEMANDS AND STORAGE USE

Thousands Acre Feet

Period	1 Run-off	2 Storage Beg.	3 Storage End	4 Required Disch.	5 Res.' Losses	6 Spills	7 Demand Kendrick Proj.	8 Demand Whalen to Tri-State Dam
1936								
Oct.-Apr.	355.4	694.1	1039.5	10.0	.0	.0	.0	.0
May	338.6	1039.5	1221.5	144.1	12.5	.0	24.0	120.1
June	212.2	1221.5	1181.9	236.0	15.8	.0	36.0	200.0
July	3.6	1181.9	889.5	280.7	15.3	.0	51.0	229.7
Aug.	29.1	889.5	676.5	231.4	10.7	.0	33.0	198.4
Sept.	20.3	676.5	597.7	92.8	6.3	.0	24.0	68.8
May-Sept.	603.8			985.0	60.6	.0	168.0	817.1
Year	959.2			995.0				
1937								
Oct.-Apr.	393.0	597.7	980.7	10.0	.0	.0	.0	.0
May	269.5	980.7	1128.2	112.9	9.1	.0	24.0	88.9
June	266.6	1128.2	1184.5	200.0	10.8	.0	36.0	164.0
July	80.9	1184.5	1047.3	205.2	12.9	.0	51.0	154.2
Aug.	16.4	1047.3	821.0	230.4	12.3	.0	33.0	197.4
Sept.	29.2	821.0	744.4	98.6	7.2	.0	24.0	74.6
May-Sept.	662.6			847.1	51.8	.0	168.0	679.1
Year	1055.6			857.1				

Sheet 19

WYOMING EXHIBIT NO. 176

NORTH PLATTE RIVER
IRRIGATION DEMANDS AND STORAGE USE
Thousands Acre Feet

Period	1 Run-off	2 Storage Beg.	3 Storage End	4 Required Disch.	5 Res.' Losses	6 Spills	7 Demand Kendrick Proj.	8 Demand Whalen to Tri-State Dam
				1938				
Oct.-Apr.	446.3	744.4	1181.2	10.0	.0	.0	.0	.0
May	311.6	1181.2	1417.1	66.9	8.8	.0	24.0	42.9
June	363.2	1417.1	1519.1	245.2	16.0	.0	36.0	209.2
July	51.2	1519.1	1260.5	292.3	17.5	.0	51.0	241.3
Aug.	16.5	1260.5	1025.7	236.6	14.6	.0	33.0	203.6
Sept.	70.7	1025.7	1008.8	80.1	7.5	.0	24.0	56.1
May-Sept.	813.1			921.1	64.4	.0	168.0	753.2
Year	1259.9			931.1				
				1939				
Oct.-Apr.	348.3	1008.8	1347.1	10.0	.0	.0	.0	.0
May	198.3	1347.1	1404.5	127.5	13.4	.0	24.0	103.5
June	102.4	1404.5	1255.7	236.1	15.1	.0	36.0	200.1
July	20.0	1255.7	966.2	292.1	17.4	.0	51.0	241.1
Aug.	20.0	966.2	742.8	233.8	10.1	.0	33.0	200.8
Sept.	22.4	742.3	667.6	90.5	6.6	.0	24.0	66.5
May-Sept.	363.1			980.0	62.6	.0	168.0	811.9
Year	711.4			990.0				

Sheet 20

WYOMING EXHIBIT NO. 176

NORTH PLATTE RIVER
IRRIGATION DEMANDS AND STORAGE USE
Thousands Acre Feet

Period	1 Run-off	2 Storage Beg.	3 Storage End	4 Required Disch.	5 Res.' Losses	6 Spills	7 Demand Kendrick Proj.	8 Demand Whalen to Tri-State Dam
				1940				
Oct.-Apr.	238.1	667.6	895.7	10.0	.0	.0	.0	.0
May	150.3	895.7	925.3	115.1	5.6	.0	24.0	91.1
June	101.8	925.3	763.3	244.3	19.4	.0	36.0	208.3
July	15.0	763.4	475.0	290.9	14.5	.0	51.0	239.9
Aug.	15.0	473.0	261.1	213.3	13.6	.0	33.0	180.3
Sept.	19.7	261.1	169.3	111.4	.1	.0	24.0	87.4
May-Sept	301.8			975.0	53.2	.0	168.0	806.9
Year	539.9			985.0				

DIRECT TESTIMONY OF WYOMING WITNESS, ELMER K. NELSON RELATING TO WYOMING EXHIBIT 176

Record pages 27573-27582

(Page 27573)

Q.—Do you now have before you Wyoming Exhibit 176?

A.—I have.

Q.—Does that consist of twenty sheets?

A.—It does.

Q.—The first sheet is a sheet of notes or explanations, is it not?

A.—Yes, sir.

Q.—On this exhibit have you covered the 37-year period 1904 to 1940, inclusive?

A.—I have.

Q.—And information is supplied separately for each year, is it not?

(27574)

A.—Yes, sir.

Q.—Will you explain the form and setup of this exhibit as to each particular year?

A.—Yes, sir. On Page 2, the right-hand column, No. 8, are the values taken directly from the previous companion exhibit. Column No. 1—

Q.—Just a moment. You spoke of the previous companion exhibit. Which exhibit is that, by number?

A.—That is Exhibit 175.

Q.—And where is Column 8 portrayed in Exhibit No. 175?

A.—That is Column B of that exhibit.

Q.—That is what is designated in Exhibit No. 175 as the required release at Pathfinder.

A.—That is right.

Q.—In Exhibit No. 176 you have it labeled "Demand, Whalen to Tri-State Dam"?

A.—Yes, sir.

Q.—Does that mean the demand from Pathfinder?

A.—That is correct.

Q.—All right. Proceed with your explanation.

A.—Column 1 is the "Adjusted Run-off at Pathfinder," which is the same as Column B of the previous Exhibit No. 175. Column 7 is the diversion demand of the Kendrick project, which

has been analyzed and derived by a previous exhibit. Column 6 is spills from the reservoir system. Column 5 is the computed evaporation losses in the reservoirs. Column 4 is the sum of the values in Column 7 (27575) and Column 8, being the required discharge that is limited to the Kendrick project diversion, plus the demand of the Whalen-Tri-State dam section. And columns 2 and 3 are placed for convenient computation of storage conditions throughout the seasons and throughout the years.

The notes on Page 1, referring in particular to the note referring to Column 6, the reservoir storage which has been determined as the basis for determining spills is indicated in this note; that is, I have used the full active capacity of Seminoe Reservoir and I have used the full active capacity of the Pathfinder Reservoir. These are in previous exhibits and have heretofore been used by Nebraska and by the United States. They are not new values.

For the Alcova storage I have used the value of 180,000 acre feet, which is followed by the word "Mean." That leaves an additional capacity in Alcova of approximately 15,000 acre feet, which is left there for the purpose of equalizing and smoothing out these computed spills. That is, the waters which come to Pathfinder, in the same way for the same reason that I discussed a moment ago as to the waters which originate below Pathfinder, are erratic and do not occur in monthly sums uniformly as is suggested by the use of the monthly values. This 15,000 acre feet is to insure reasonable determination of the spill; that is, there might sometimes be 15,000 acre feet captured in this reservoir which, again, would be released and again be available to capture spills, or to control the run-off at times when the reservoirs were near capacity.

Q.—You have included in the note with relation to the (27576) storage in the reservoir, the statement that when the storage in the Alcova reservoir declines to 160,000 acre feet, the Kendrick Project will not divert water?

A.—I have.

Q.—You have already covered that exhibit, I believe, in your earlier testimony?

A.—Yes, sir.

Q.—Now, with reference to Column I of Exhibit 176, the "Run-off at Pathfinder", has that been adjusted to present conditions?

A.—Yes, sir. It has been adjusted to future conditions. It has—

Q.—By "adjustment to future conditions," do you mean that you have adjusted it to the additional depletion of the approximately 75,000 acre feet above Pathfinder?

A.—That is correct.

Q.—So it has been adjusted to existing conditions, and then an additional adjustment made for the additional depletion?

A.—That is correct.

Q.—Your required discharge in Column 4 is the sum, is it not, of the demand of the Kendrick project, Column 7, and the demand from Pathfinder for Whalen-Tri-State dam section, in Column 8?

A.—It is. In addition, I have shown, under the required discharge column, Column No. 4, an October-April discharge of 10,000 acre feet, which I have carried throughout the 37-year period.

Q.—What is the purpose of that, Mr. Nelson?

A.—I have recognized that in the past the Bureau of Reclamation (27577) has been required at times to discharge some flows from Pathfinder because of industrial uses in the Casper area, rather non-consumptive uses. I have assumed, of course, that the return flows from the Kendrick project would also increase the flow of the river in that vicinity. In connection with this release of 10,000 acre feet in the October-April period I have not at any time carried that water on down to Whalen; I have just assumed it lost; that is, that is stated because there will be that unbalance between figures if it is not understood that I have not carried the 10,000 acre feet through in the winter months as far as the water arriving at Whalen is concerned. It is not considered a part of that water.

Q.—Historically, has there been some October-April discharge since the operation of the Pathfinder reservoir?

A.—There has.

Q.—Do you know in what quantity, or have you those figures?

A.—Yes, sir. We have an exhibit which shows the historical conditions for the last ten-year period, the average discharge of which was 34,000 acre feet; but if we took out of that one or two extremely high years, which normally would not occur, the discharge or release which they did make would be a great deal smaller.

Q.—Is it your opinion that over a long period of time the

10,000 acre feet would be ample to cover the contingencies that you have mentioned?

A.—Yes, it is ample and probably would not always be necessary. It would depend upon precipitation and run-off—local precipitation, snows, and so on, during that time, which would at times make (27578) it entirely unnecessary to release that water. Nevertheless, throughout the drouth period, and throughout all years, 10,000 acre feet has been assumed to be discharged, which might not be necessary; it is a safety factor.

Q.—How have you determined the reservoir losses in Column 5 that you show on this Exhibit?

A.—I have a note on Column 5 which may require additional explanation. The recorded evaporation losses at Pathfinder were taken in 1915. There is a period of 1904 to 1914, inclusive, during which there were no data. I used from a Colorado exhibit the mean evaporation—the May-September evaporation of Pathfinder—and I found that throughout recorded periods it was high and low and varied approximately as the evaporation did at Fort Collins, Colorado, which covers the complete period. Therefore, I applied departures with respect to the Fort Collins station to the mean computed in the Colorado exhibit, for the May-September period, and divided that quantity between the May-September months in proportion to the division shown on the Colorado exhibit, which shows the occurrence during May-September of evaporation. That was applied then monthly to the mean reservoir surface during the month, first by a preliminary computation trial and error as to what the storage would be and what the surface area exposed would be, and then as the computation was carried through it was finally adjusted to what I believe the mean conditions were; so that the reservoir losses in Column 5 are computed on the basis of mean reservoir surfaces during the month.

Q.—Do your reservoir losses take into account throughout the (27579) period, and from month to month, the different exposed surfaces because of the differing amounts of water in the reservoirs?

A.—They do.

Q.—You started on this study, did you not, with reservoirs assumed empty at the commencement of the period?

A.—Yes, sir. At the beginning, October, 1904, in Column 2, it will be noted that the storage was zero.

Q.—Have you assumed throughout this exhibit the operations of all three reservoirs for the entire period?

A.—I have.

Q.—How did you compute the storage at the beginning and the end of the months?

A.—The computation is in this manner: Referring to sheet 2, the run-off October-April, 1904, was 365,000 acre feet which came to the storage units. At the end of the October-April period there would have been discharged 10,000 acre feet, and therefore there would have remained in storage 355,000 acre feet, and that is carried down to the storage as at the beginning of May, 1904; and the same computation then is made that the run-off of 328,500, plus the storage at the beginning of the month —355,000—is equal to the storage at the end of the month—581,500—plus the required discharge in Column 4—98,900—plus the reservoir losses of 3,100.

Q.—Was the same method used throughout the exhibit?

A.—That is correct.

Q.—Does this exhibit assume throughout the 37-year period the additional depletion above Pathfinder?

(27580)

A.—It does.

Q.—Does it assume throughout a complete supply for the Kendrick Project based upon the previous exhibit, where you set up the demands according to one of Mr. Conkling's exhibits?

A.—It does.

Q.—Does it assume throughout a complete supply for the Whalen-Tri-State Dam area in the amounts that have been set up on previous exhibits?

A.—Yes, sir.

Q.—Now, what conclusion did you arrive at in carrying this study through the 37-year period, at the end of the year 1940?

A.—That beginning with zero storage in 1904 all demands would have been fully met throughout the 37-year period.

Q.—Would there have been any water remaining in the reservoir system at the end of the period?

A.—Yes. That is indicated on Page 20, under Column 3, for the month of September as 169,300 acre feet.

Q.—From this study and applying the requirements that you have, then, have you found that there would have been a complete supply at all times, with 169,300 acre feet left in storage at the end of September, 1940?

A.—That is correct.

Q.—Mr. Nelson, are you to some extent familiar with the run-off between the years 1895 and 1904?

A.—I am not familiar with the run-off, but I am familiar with the values which have been computed by other engineers, which appear (27581) on Colorado exhibits, and also on the Wyoming exhibit, the Wyoming exhibit being an exhibit which was a report, prepared by Mr. Meeker, which was used in Wyoming Exhibit 100. These are computed amounts, but I am familiar with the nature of the run-off which would have occurred has these computed amounts been approximately correct.

Q.—Assuming the computed amounts for the 1895-1903 period to be approximately correct, could you have extended this study back commencing in the year 1895 and have had a complete supply for all of these requirements during the 1895-1940 period?

A.—Yes, sir. It wouldn't have changed the computation on this exhibit.

Q.—And that woud be a 46-year period, would it not?

A.—That is correct.

Q.—Mr. Nelson, in using the supply to meet the demands in the way that you have upon Wyoming Exhibit No. 176, were there any spills from the Seminoe, Pathfinder and Alcova reservoir system?

A.—Yes, sir.

Q.—Will you point it out on this exhibit? I believe the year 1907 is where the first spill appears.

A.—It is shown on Sheet 3. In 1907 the first spill occurred, and those spills continued more or less uniformly for three more years thereafter, up to 1911, on Sheet 5. Referring to Sheet 6, beginning with the year 1912, the years 1912 and 1913 and 1914 also indicated spills. Referring to Sheet 8, the year 1917 shows a very heavy spill, this being a very abnormal run-off year. The next (27582) several years, clear through 1924, beginning with 1917, all indicated spills of considerable magnitude. Referring to Sheet 13, for the year 1926, we find that for the succeeding years, being a five-year period, up until 1930, there were continuous spills.

Q.—Was 1933 the last year in which a spill occurred under this operation?

A.—It was. It was the only year in the drouth period, so-called, of 1931-1940, in which a spill would have occurred.

Q.—That is shown, is it not, on Sheet 16?

A.—That is correct.

Q.—You have in a later exhibit indicated what the mean annual average of these spills would be?

A.—I have.

Q.—That is used in another connection on a later exhibit, is it not?

A.—Yes, sir.

Q.—Do you have any additional explanation you care to make concerning Exhibit No. 176?

A.—No sir, I think we have covered it.

DIRECT TESTIMONY OF WYOMING WITNESS, ELMER K. NELSON, RELATING TO WYOMING EXHIBIT 170

Record pages 27528-27539.

(Page 27528)

Q.—Do you have before you Wyoming Exhibit No. 170?

A.—I do.

Q.—That consists of how many sheets?

A.—This exhibit consists of three sheets; two single sheets of notes and one folded page.

Q.—Are the first two sheets explanatory notes and notes giving the sources of the data contained in the exhibit?

A.—They are.

Q.—On this exhibit you have fourteen columns?

A.—That is correct.

Q.—The first column is the year.

A.—Yes, sir.

Q.—You have covered how many years, Mr. Nelson?

A.—The period 1904-1940, inclusive, being a 37-year period.

Q.—Why have you covered that period on this exhibit?

A.—That is the longest period for which records are available. In the earlier part, particularly in the earliest two or three years, (27529) only May-September, and occasionally an April record were available, but the other months have been computed and inserted into the record of this case, so that the values represented hereon are all annual values—water-year values.

Q.—Under the second column headed "NorthGate," what does that letter "e" following the first several years' measurements, indicate?

A.—That was copied from Nebraska Exhibit No. 3, which contained the letter "e". This explanation I can give, I think, from such exhibit, although it may be referred to directly: These

values were computed by Mr. Meeker—I do not recall whether in full or in part—but I believe that they were all computed for those years followed by the letter "e".

Q.—The same letter "e" appears opposite several values in Column 13. Would you explain that, please?

A.—They are estimated by me. They have no relation to the other "e".

Q.—And under Column 6, the Seminoe column, there are several figures followed by the letter "a". What is the explanation for that?

A.—As indicated on Page 1, note for Column 6, the values followed by "a" were derived by me from monthly correlation curve with Saratoga station data. It will be noted that they followed the first period approximately as of Column 2, but, in addition, includes four years, from 1926 to 1929, inclusive.

Q.—This exhibit contains certain data, does it not, arranged in (27530) down-stream order, commencing on the left and going down-stream?

A.—It does.

Q.—In Column 2, is that the water-year run-off at Northgate?

A.—All these values are water year values, yes, sir.

Q.—The values are in thousands acre feet througout?

A.—That is correct.

Q.—Then in Column 4 you have the Saratoga run-off, is that right?

A.—Yes, sir.

Q.—What is Column 3, in between the two, designation being "Gain, Net"?

A.—That is the computed difference between Column 4 and Column 2, being Column 4 minus the value of Column 2.

Q.—And Columns 4 and 6 have the Saratoga and Seminoe run-off, and in between, Column 5, "Gain, Net"?

A.—That is correct.

Q.—Will you explain that?

A.—Thit is the difference between the values of Column 6 and Column 4.

Q.—And that Column "Gain, Net" is the quantity determined in the same way as the other columns in the exhibit, is that right?

A.—That is correct.

Q.—Do you have means for the 37-year period at the bottom of the page?

A.—I do.

(27531)

Q.—At Northgate, 376,800 acre feet?

A.—Yes, sir.

Q.—With a net gain between Northgate and Saratoga of 547,700?

A.—That is correct.

Q.—Is a portion of that gain between Northgate and Saratoga attributable to run-off crossing from Colorado into Wyoming?

A.—It is.

Q.—And how much?

A.—Applied to the present condition mean—we are now speaking of the means of that line which is headed by "Means" —that is the historical mean of the values above, and to apply a correction to that, we would reduce it first to the present condition mean, because that is the computation of the Colorado exhibit, which indicates present conditions—how much water comes from Colorado into Wyoming below the Northgate gauging station.

Q.—Will you explain to the Court what method or formula you used in the last line on the page which is headed "Means, Present Conditions"?

A.—Yes, sir. The values of Column 8 are from Wyoming Exhibit 100—that is, from the column in such exhibit of historical run-off—below the value of which the average for the historical run-off is 1,316,000 acre feet, which has an asterisk before it, appears a value as of 1,293,000 acre feet, which is the average of the same period of run-off, present conditions, from Wyoming Exhibit 100. The relation between these two values has been applied to all the (27532) values to the left—the values at Northgate, Saratoga and Seminoe; that is, it is assumed that throughout this basin, as the Wyoming exhibit assumed, the relation between the present condition run-off and long-time historical run-off was approximately the same at any particular gauging station; and that is the relation heretofore assumed in previous exhibits of Nebraska.

Q.—Does the last line on the page purport to show what the run-off would be under present conditions based upon the historical period?

A.—It does, and with reference to such value under Column 3, being the gain from Northgate to Saratoga, or a value of 540,000 acre feet. Of that amount, referring to Note (i) on Page 2

of the exhibit, it is stated that the amount originating in Colorado—from Colorado exhibits—is 135,000 acre feet. Therefore, the contribution from Wyoming would be 405,000 acre feet, which is not shown separately on this exhibit.

Q.—In Column 9 what have you portrayed?

A.—In Column 9 are the net losses in Pathfinder reservoir.

Q.—How did you obtain those?

A—I have computed those by the inflow-outflow method, taking into account storage; and they are for the May-September period.

Q.—In the first five years at the top of Column 9, the list is denoted as zero.

A.—The storage began in Pathfinder in 1909.

Q.—Can you explain the small discrepancy between the Column 8 (27533) figure, run-off into Pathfinder, and discharged from Pathfinder in Column 10, in those years when there was no reservoir loss?

A.—Yes. I took for the purpose of this study, the values in Column 8 from Nebraska exhibit 6 and Wyoming Exhibit 100, which were identical, and Column 10 I took from Colorado Exhibit 93. The Colorado exhibit indicates a larger run-off, for the most part, aggregating for the period where there is a defference, which is confined chiefly to the first three years of the period, approximately 100,000 acre feet, or averaging for the five years about 20,000 acre feet annually; but, so far as the 37-year period is concerned, it would not have any material effect. Had I used Nebraska exhibit data instead of Colorado exhibit data for Column 10, I would have had a smaller value and, therefore, the net gain of Column 11 would have appeared to be larger by just that same amount.

Q.—With reference to Column 9, where you have the net losses of Pathfinder, in the last line on the page, "Means, Present Conditions," you have the figure 45.0, indicating forty-five thousand?

A.—Yes, sir.

Q.—How do you arrive at that?

A.—I found that the actual long-time mean of computed data was 45,500, and assumed that a value close enough for use would be 45,000, covering the present conditions of the situation.

Q.—Well, would that cover losses solely on the Pathfinder, or on the three reservoirs?

A.—The Pathfinder losses. And, of course, after the other

(27534) reservoirs came into operation, you will find that the values for 1939 and 1940 are the values from the exhibit we produced yesterday. They are whatever losses occurred.

Q.—In Column 10 you have shown Pathfinder discharge, and Column 12 inflow at Guernsey. What is the mean gain between those two points?

A.—The mean historical gain is 287,000 acre feet, and under present conditions 10,000 acre feet less, or 277,000 acre feet.

Q.—Are all of these gain figures net figures, Mr. Nelson?

A.—They are.

Q.—And whatever use or uses may be made in any section, or whatever consumption was made from such uses, is automatically accounted for?

A.—That is correct.

Q.—Now, in this gain between Pathfinder and Guernsey, you showed on a previous exhibit, I believe, that in that area, historically, in the 1931-1940 period, there was diverted for irrigation from the main river 28,000 acre feet annually?

A.—That is correct.

Q.—The gain is after such use has been made, is it not?

A.—That is correct.

Q.—Is the contribution of that section of the river that you have indicated here likewise after uses have been made on the tributaries in that section?

A.—Yes.

(27535)

Q.—Whatever return flow comes from the irrigation upon the river would be automatically accounted for in the net gain?

A.—That is correct.

Q.—And whatever consumptive use occurred would likewise be accounted for?

A.—That is correct.

Q.—Will you explain Column No. 13, where you have "Net Gain L. R."?

A.—This column represents the run-off at the Laramie River mouth. The first eleven or twelve years of the period, followed by "E" are inserted to fill out the exhibit more than for their value; their value has not been used in the determination of any mean, but only the values from 1915 to the end of the period. The Laramie River at the mouth has been measured and recorded in detail since 1915, and these are the values that are placed herein.

Q.—These values take account of the diversions made from Laramie River for either power or irrigation uses?

A.—These are published values, which include such diversions.

Q.—In other words, this is the amount of water that would have arrived at the mouth of the river if the diversions had not been made?

A.—It is assumed to be that, yes.

Q.—In the last line, No. 14, you have, at the head of the column, "Net, Run-off, 12 plus 13". What is that?

A.—It is the sum of the values of Columns 12 and 13, but such (27536) average under the line "Means" is not particularly of any meaning so far as I have used it in determining the means present conditions. I should like to explain that. Beginning with the means, present conditions, under Column 8, and subtracting therefrom the mean reservoir loss from Pathfinder, we derive what the mean Pathfinder discharge would have been had the reservoir been completely emptied at the end of the period; and adding to this the mean gain from Pathfinder to Guernsey, as reduced to present conditions, we derive the value at Guernsey of 1,525,000 acre feet. The present condition mean run-off of Laramie River has been assumed here under present conditions to be some 40,000 acre feet less than the historical mean, and adding this to the value under Column 12 we derive the value of 1,615,000, which would be equivalent only as a mathematical quantity to the sums of the values preceding it.

Q.—Will you explain why you made the reduction as to the Laramie River in the line "Means, Present Conditions"?

A.—Yes. I believe that, if the storage on Laramie River as now developed had been in use throughout the period of the record, much of this water would not have flowed out into the North Platte River; it would have been saved in storage above, and would have increased the uses above—the increased consumptive uses above—and would have eliminated a large amount of that waste. Preliminary studies indicate that the reduction made on account of the Laramie River under present storage conditions would be about 20,000 acre feet a year. That still leaves a difference of 22,000 unacounted for (27537) which I can cover better, I believe, after we come to another exhibit. Ten thousand feet is assumed to take care of their reduction to present conditions of historical values in Column 11, being the gains between Pathfinder and Guernsey, and, although I might have to repeat this,

the other ten thousand or twelve thousand is for whatever losses might accrue to use of this net gain between Pathfinder and Guernsey and through the Guernsey reservoir and between Guernsey and Whalen; so that I think the total water as accounted for is indicated on this exhibit.

Q.—Does the supply of water at Guernsey include the Laramie River?

A.—Yes, sir.

Q.—And what would be available at that point or below for use, unless further depleted above?

A.—That is correct.

Q.—Now, in the gains throughout the area from Northgate to Guernsey, have you computed any total gains between the two points?

A.—I have.

Q.—Will you give us that information, please?

A.—Yes. The total gains throughout Wyoming would be 1,155,000, which, added to the 505,000 discharge from Colorado, would give a total water of 1,660,000 acre feet, which may be checked on the exhibit by adding to the value in the last column at the bottom the Pathfinder reservoir loss of 45,000.

Q.—In speaking now of these totals you are using the means under (27538) present conditions?

A.—I am.

Q.—How do you account for the 505,000 acre feet contributed from Colorado? What are the sources of that?

A.—The run-off at Northgate, Colorado, of 370,000 acre feet, plus the 135,000 acre feet which flows to Wyoming from Colorado at the gauging station, chiefly from Big Creek and Encampment River territories.

Q.—This amount of water is carried through, is it not, from Northgate to Guernsey after all losses have been accounted for?

A.—Yes. This is the net water.

Q.—And whatever conveyance loss there may be on the water originating in Colorado has been automatically taken out of the Wyoming quantity?

A.—Yes, sir. It is absorbed, section by section, by the computation of net values through Wyoming.

Q.—The Colorado quantity of 505,000 is the amount at or near the Colorado-Wyoming line?

A.—That is correct.

Q.—Under present conditions, of this supply of 1,615,000 acre

feet, after reduction of 45,000 acre feet Pathfinder loss, what use is made by Wyoming as to the acreage irrigated below Whalen from the main North Platte River?

A.—The use that is made of this water is all confined to the area from below Whalen to the Nebraska line, and that use is made upon the area in the Lingle-Hill Irrigation District, of about (27539) 14,200 acres; some 2,800 acres under the Pathfinder Irrigation District in Wyoming; some 18,000 acres under private canals in Wyoming, and the acreage in the Goshen Irrigation District, which I have not isolated.

Q.—Well, would an approximate figure for the lands irrigated from that supply in Wyoming be about 85,000 acres?

A.—Between 85,000 and 90,000, yes, sir, probably 85,000.

Q.—With reference to these net gain figures, directing your attention to the situation above Pathfinder, there is a considerable amount of irrigation on the tributaries in Wyoming above Pathfinder, is there not?

A.—There is.

Q.—And are these net gains residual from the standpoint that the uses and the consumption of the irrigation above Pathfinder has been accounted for?

A.—Yes, sir; these net gains are under present conditions or uses in operation.

Q.—And, of course, excluding conveyance loss on tributaries?

A.—Yes, they are net water.

WYOMING EXHIBIT NO. 170

NORTH PLATTE RIVER IN WYOMING

SECTIONAL NET GAINS, HISTORICAL, AND RUN-OFF AT GAUGING STATIONS

Sources of Data

Col. 2. Nebraska Exhibit 3, Colorado Exhibit and later Published Data.

Col. 4. Nebraska Exhibit 4 and later Published Data.

Col. 6. Nebraska Exhibit 5 and later Published Data. Values followed by "A" derived by Nelson from monthly correlation curve with Saratoga Station data.

Col. 8. Nebraska Exhibit 6 and Wyoming Exhibit 100 with correction noted in Colorado Exhibit 93.

Col. 9. Computed by Nelson from Exhibits of Flow and Storage Data. Values are Net May-Sept. Losses.

Col. 10. Data for 1904-1908 from Colorado Exhibit 93. Total difference as to Col. 8 about 20,000 acre feet annually.

Col. 12. Pertinent Nebraska and Colorado Exhibits.

Col. 13. Run-off of Laramie River at Mouth. Data from Nebraska Exhibit 11 and Colorado Exhibit 98 and later Published Data. Contributions to Section of other tributaries, not return flow from North Platte River diversions, is not known.
Values followed by "E" are estimated from related data by Nelson but are not used in Means.

Notes

(a) Seminoe Canyon flow plus Seminoe Reservoir Storage end of year plus 4,000 acre feet Reservoir evaporation loss estimated.

(b) Sum of North Platte River above Seminoe Reservoir and Medicine Bow River above Seminoe Reservoir.

(c) In Col. 2, values followed by "E" are by Meeker, Neb. Ex. 3, and fall midway between values of Colo. Ex. 10 and studies by Nelson by correlating monthly values with Saratoga flows.

(d) See note for Col. 9.

WYOMING EXHIBIT NO. 170

NORTH PLATTE RIVER IN WYOMING

SECTIONAL NET GAINS, HISTORICAL, AND RUN-OFF AT GAUGING STATIONS

Notes

(e) See note for Col. 10.

(f) 1904-1940 average of values of Col. 18 = 140.0 The value given is the average of the period, 1915-1940.

(g) Value of Exhibit reduced 100,000 acre feet. During the month of June the Published value was 601.0, whereas the record of Run-off into Pathfinder is given at 542.0. It appears that the gauging station record for Seminoe Canyon was partially estimated. The value given is therefore reduced.

(h) Sum of Means of Cols. 12 and 13.

(i) Originating in Colorado, from Colo. Ex., 135.0.

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NORTH PLAT

SECTIONAL NET GAINS, HISTOR
YEARLY FLOWS AT GA

Tho

1 Year	2 Northgate	3 Gain, Net	4 Saratoga	5 Gain, Net	6 Seminoe	7 Gain, Net
1904	(c) 410.0 E	587.8	997.8	195.2	1193.0 A	69.0
1905	370.0 E	539.9	909.9	180.1	1090.0 A	69.4
1906	420.0 E	602.5	1022.5	200.5	1223.0 A	128.0
1907	530.0 E	768.0	1298.0	396.0	1694.0 A	157.1
1908	270.0 E	394.0	664.0	157.0	821.0 A	97.5
1909	730.0 E	1040.4	1770.4	476.6	2247.0 A	134.3
1910	250.0 E	359.0	609.0	241.0	850.0 A	68.1
1911	360.0 E	525.0	885.0	183.0	1068.0 A	55.4
1912	500.0 E	718.1	1218.1	364.9	1583.0 A	237.5
1913	360.0 E	511.1	871.1	256.9	1128.0 A	137.0
1914	490.0 E	716.9	1206.9	228.8	1435.7	115.2
1915	278.7	340.2	618.9	204.0	822.9	77.3
1916	375.2	512.1	887.3	163.0	1050.3	203.1
1917	626.5	973.6	1600.1	694.4	2294.5	104.9
1918	454.6	638.5	1093.1	275.1	1368.2	117.9
1919	221.0	391.3	612.3	186.5	798.8	60.4
1920	484.0	761.5	1245.5	445.9	1691.1	178.7
1921	508.9	844.1	1353.0	306.1	1659.1	122.9
1922	275.9	484.4	760.3	270.0	1030.3	117.9
1923	506.3	560.5	1068.8	324.1	(g) 1392.9	107.9
1924	396.9	436.8	833.7	388.6	1222.3	267.6
1925	319.4	518.4	837.8	303.4	1141.2	103.5
1926	532.1	729.3	1261.4	374.6	1636.0 A	140.5
1927	415.6	614.0	1029.6	311.4	1341.0 A	115.2
1928	506.8	742.1	1248.9	377.1	1626.0 A	99.4
1929	523.5	695.6	1219.1	321.9	1541.0 A	361.7
1930	345.2	345.7	690.9	159.5	850.4	222.4
1931	182.4	297.8	480.2	108.1	588.3	118.0
1932	440.1	583.3	1023.4	341.4	1364.8	141.3
1933	258.8	473.1	731.9	307.9	1039.8	109.7
1934	89.1	149.4	238.5	73.8	312.3	69.9
1935	200.6	328.1	528.7	120.9	649.6	46.6
1936	332.1	470.0	802.0	171.9	973.9	71.7
1937	215.0	430.7	645.7	257.4	903.1	227.5
1938	400.3	533.7	934.0	256.9	1190.9	144.0
1939	204.7	351.4	556.1	83.9	(a) 640.0	58.2
1940	155.3	295.6	450.9	72.6	(b) 523.5	46.3
Means.....	376.8	547.7	924.5	264.5	1189.9	127.0
*Means, Present Conditions....	370.0	(i) 540.0	910.0	260.0	1168.0	125.0

* Based on Wyo. Ex. 100.

R IN WYOMING

D RUN-OFF AT GAUGING STATIONS
TATIONS; OCT. 1.—SEPT. 30

re Feet

inder	9 Losses Net	10 Pathfinder Discharge	11 Gain, Net	12 Guernsey	13 Net, Gain L.R.	14 Net, Run-off (12) + (13)
2.0	(d) .0	(e) 1276.4	295.3	1571.7	135.0 E	1706.7
9.4	.0	1229.0	519.0	1748.0	170.0 E	1918.0
1.0	.0	1386.0	387.0	1773.0	173.0 E	1946.0
1.1	.0	1842.3	591.1	2433.4	295.0 E	2728.4
8.6	.0	918.6	603.2	1521.8	125.0 E	1646.8
1.8	19.8	2231.3	275.5	2506.8	305.0 E	2811.8
3.1	19.0	1008.6	176.6	1185.2	65.0 E	1250.2
3.4	23.9	1098.4	92.2	1190.6	65.0 E	1255.6
0.5	45.7	1470.0	274.5	1744.5	170.0 E	1914.5
5.0	41.1	1310.5	236.3	1546.8	130.0 E	1676.8
0.9	68.2	1312.5	178.5	1491.0	120.0 E	1611.0
0.2	41.7	945.1	349.0	1294.1	91.4	1385.5
3.4	50.8	1156.0	205.0	1361.0	71.3	1432.3
9.4	71.0	1994.1	580.7	2574.8	397.4	2972.2
3.1	64.2	1498.3	526.1	2024.4	191.5	2215.9
9.2	62.8	1116.6	115.2	1231.8	70.4	1302.2
0.1	70.7	1373.8	490.4	1864.2	194.6	2058.8
2.0	67.1	1791.7	163.8	1955.5	167.1	2122.6
3.2	64.0	1356.4	170.3	1526.7	89.5	1616.2
0.8	56.2	1087.3	389.2	1476.5	131.7	1606.2
9.9	62.8	1876.1	351.9	2228.0	239.8	2467.8
1.7	38.2	1285.5	265.8	1551.3	72.8	1624.1
3.5	49.4	1446.4	242.5	1688.9	191.5	1880.4
3.2	66.7	1278.8	332.7	1611.5	183.4	1794.9
5.4	56.8	1749.8	301.3	2051.1	216.1	2267.2
2.7	65.2	1719.9	387.3	2107.2	275.0	2382.2
2.8	53.4	1206.5	278.2	1484.7	177.0	1661.7
3.3	36.0	1004.0	242.0	1246.0	99.8	1345.8
3.6	36.8	1311.2	192.4	1503.6	76.8	1580.4
0.5	39.3	1147.3	368.2	1515.5	73.2	1589.1
2.2	14.0	485.3	107.3	592.6	36.3	628.9
3.2	16.1	677.6	169.5	847.1	67.0	914.1
5.6	25.8	1017.2	74.7	1091.9	60.1	1152.0
0.6	26.6	1049.4	229.3	1278.7	72.6	1351.3
1.9	43.0	975.5	212.0	1187.5	80.4	1267.9
1.2	38.6	991.5	153.7	1145.2	54.6	1199.8
0.8	24.0	548.9	95.6	644.5	40.2	684.7
3.0	45.5	1275.0	287.0	1562.0	(f) 132.0	(h) 1694.0
3.0	45.0	1248.0	277.0	1525.0	90.0	1615.0

Tightly Bound

WYOMING EXHIBIT No. 171

NORTH PLATTE RIVER

(Data from U. S. Ex. 143, Sheet 5; Conkling)

***NET DEMAND OF KENDRICK PROJECT

Thousands Acre Feet

I Diversions

Oct.	Nov-Mar.	April	May	June	July	Aug.	Sept.	Total
0	0	0	24.0	36.0	51.0	33.0	24.0	168.0

II Return Flows

9.4	33.0(a)	7.5	7.4	7.5	7.7	11.3	12.2	96.0

III Net Irrigation Demand at Alcova;

	16.6	28.5	43.3	21.7	11.8	122.0
***Round Numbers,	17.0	28.0	43.0	22.0	12.0	122.0

IV Return Flows Available for Supplementing mean Oct.-April Diversion by Interstate Canal to Storage:

9.4	7.5	17.0

(a) Assumed for these months 9, 8, 5, 5 and 6 thousand acre feet respectively.

EXCERPTS FROM WYOMING EXHIBIT 173

Sheet 14

MEANS—1904-1940

	May	June	July	August	Sept.	Year	May-Sept.
Line 10. Historical Gain Pathfinder to Whalen	72,200	38,500	7,00	4,900	18,200	287,000	141,000

MEANS—1931-1940

	May	June	July	August	Sept.	Year	May-Sept.
Line 10. Historical Gain Pathfinder to Whalen	32,400	9,100	-2,800	5,800	24,700	184,500	69,300

Note: All values in acre feet.

EXCERPT FROM UNITED STATES EXHIBIT 267 ENTITLED "REQUIREMENT MAY-SEPTEMBER OF INTER-STATE AND FORT LARAMIE CANALS"

Fort Laramie Canal	291,000 acre feet
Lingle and Hill Irrigation Districts	53,500 acre feet
Pathfinder Irrigation District	378,800 acre feet
Total	723,300 acre feet

EXCERPT FROM UNITED STATES EXHIBIT 269 ENTITLED "IRRIGATION REQUIREMENT MAY THROUGH SEPTEMBER FOR STATE LINE CANALS AND REGULATION"

Tri-State Canal	192,100 acre feet per year
Northport Canal	60,000 acre feet per year
Gering Canal	35,600 acre feet per year
Mitchell Canal	34,100 acre feet per year
Excess for Regulation	25,000 acre feet per year
Less Tri-State Interceptions	—39,000 acre feet per year
Total	307,700 acre feet per year

ASSUMED DEMAND OF KENDRICK PROJECT

Column 29, U. S. Exhibit 273

May	19,200 acre feet
June	34,000 acre feet
July	51,400 acre feet
August	51,200 acre feet
September	29,000 acre feet
Total	184,800 acre feet

REQUIREMENTS OF WHALEN-TRI-STATE DAM SECTION USED IN UNITED STATES STUDY, UNITED STATES EXHIBITS 267 TO 273.

Testimony of Barry Dibble, United States Witness, Record page 28699:

(28699)

Q—Will you refer now to Column 45, which is headed "Draft on Guernsey to supply State line demand and intermediate canals," and explain the meaning of the heading and the derivation of the values?

A—Under Column 45, the "Draft to supply the State line canals" means the demand to supply the Mitchell, Gering and Tri-State Canals, including also the diversion for the Northport project and the preferred rights of the Tri-State canal, plus the allowance of 5,000 acre feet per month for regulation at the Tri-State Dam. The intermediate canals are meant to include the Wyoming canals between Whalen and the State line, and this includes the Burbank, the Lucerne, the Gratton, the Rock Ranch, Torrington, North Platte, Narrows, Ferris No. 1 and French. The plan followed is described in Note J on Sheet 7, which indicates how this computation is made. In making the computation in this way, the calculation has been made based upon the historic requirements of these intermediate canals.

Q—By that, you mean that the Wyoming private canals between Whalen and the State line have been permitted to divert the amount of water which historically they did divert?

A.—Yes. They have not been assembled in detail. The calculation has been made from the net accretions in the river in such a way as to allow for the full historic requirement.

EXCERPTS FROM TESTIMONY OF C. F. GLEASON, CONCERNING U. S. EXHIBIT 204-A

DIRECT EXAMINATION, RECORD PAGES 27979 TO 27989

(Page 27979) December 2, 1941.

Q.—Will you state your full name, Mr. Gleason?

A.—C. F. Gleason.

Q —What is your age, Mr. Gleason?

A.—Fifty-eight.

Q.—What is your residence?

A.—Guernsey, Wyoming.

Q.—What is your profession or occupation?

A.—Engineer.

Q.—Are you now employed by the United States Bureau of Reclamation?

A.—Yes, sir.

Q.—How long have you been employed by that agency?

A.—Since 1907.

Q.—What position do you now hold with the Bureau?

(27980)

A.—Superintendent of Power.

Q.—Will you please state, briefly, the functions and responsibilities of that position?

A.—I am in charge of the power system of the North Platte project and of the storage of water and the diversion works of the North Platte project.

Q.—In ordinary parlance, are you, in effect, the manager of the North Platte project?

A.—Yes.

Q.—In such position, is it your responsibility to operate the reservoirs of the project and to effect the delivery of storage water, generally, to the canals of the project and to the lands under canals having Warren Act contracts?

A.—Yes.

Q.—In effecting the deliveries of water from the reservoirs, is there need for determining the amount of storage water that is lost in transit from the two upstream reservoirs to the Guernsey reservoir or to point of diversion at Whalen?

A.—Yes.

Q.—Will you please explain why that necessity arises?

A.—At times when storage water is being carried in the North Platte River, it is essential to compute the rate of flow of storage water at Guernsey and Whalen, in order to determine the rate of natural stream flow.

Q.—Do I understand from that, Mr. Gleason, that in making diversions (27981) you find it necessary to make a distinction between natural stream flow on the one hand and storage water on the other hand?

A.—Yes, that is necessary in a good administration.

Q.—And the determination of the losses to be charged against storage water is a necessary part of the larger determination of the natural flow and storage?

A.—Yes.

Q.—Is there a need to determine losses in storage water be-

tween Whalen and the Wyoming-Nebraska State line?

A.—Yes.

Q.—Is that for the same reason?

A.—The same reason.

Q.—Have you ever had discussions with Mr. R. H. Willis, the Chief of the Nebraska Bureau of Irrigation, water power and drainage, and with the State Engineer of Wyoming, regarding the computation of the loss to storage water from Pathfinder dam to the Wyoming-Nebraska State line?

A.—Yes, we first had discussions regarding that matter in 1931 and we have had them at various times since.

Q.—I hand you a document which is Nebraska Exhibit 88-A entitled "Evaporation Charge on Reservoir Water Conveyed in the Channel of the North Platte River from Pathfinder Reservoir to Wyoming-Nebraska Line, as agreed upon at Guernsey office, U. S. Bureau of Reclamation, on May 26, 1931, by C. F. Gleason, Engineer, U. S. Bureau of Reclamation, John A. Whiting, State Engineer of Wyoming, and R. H. Willis, (27982) Chief of the Bureau of Irrigation, Nebraska." Are you the C. F. Gleason referred to in that heading?

A.—Yes.

Q.—Please keep that document before you while I hand you a document which has been marked for identification as United States Exhibit 204-A. Do you recognize the documents contained in United States Exhibit 204-A?

A.—Yes, they are copies of correspondence from the files of the Bureau of Reclamation at Guernsey.

Q.—Are those, to your knowledge, authentic copies of the original official document?

A.—They, they are authentic copies.

Q.—Where are the original copies? Do you have them here with you?

A.—I have the original copies of the correspondence, and later I received a letter from Mr. Bishop and one, I believe from Mr. Willis.

Q.—Do you have the official file copies of the correspondence written by you which is included in this exhibit?

A.—Yes.

Q.—Are all of the materials which are copied into this exhibit part of the official records of your office in ordinary and regular official use?

A.—Yes.

(27983)

Q.—Mr. Gleason, will you refer to Sheet 1 of United States exhibit 204-A, and state whether the acreage figures shown in Column 1 of the tabulation were the foundation for the losses as evaluated in second feet shown on Nebraska Exhibit 88-A?

A.—Yes, those are the acreage figures we used in 1931.

Q.—And are those figures stated in that column the figures which are stated in the first paragraph of Sheet 1, following the tabulation, which were, as marked, abandoned in March, 1940?

A.—Yes, those are the figures that we used in 1931 and marked "Abandoned March, 1940."

Q.—Will you please turn to Page 3 of this Exhibit 204-A? Page 3 purports to be a memorandum headed "U. S. Bureau of Reclamation, North Platte Project. Basis for computing reservoir evaporation losses and river carriage losses on storage water, season of 1940." Will you state the origin of this memorandum?

A.—That was gotten out by myself along, I think, in March, 1940, or soon thereafter. It doesn't seem to be dated, but it was in the spring of 1940.

Q.—Was a copy of that memorandum sent to Mr. Willis as an (27984) enclosure with your letter of May 20th, 1940, which is Sheet 2 of this exhibit?

A.—Yes.

Q.—Was a copy of it also sent to Mr. Bishop, the State Engineer of Wyoming, as an enclosure with your letter of May 20th addressed to him, which is Sheet 5 of the exhibit?

A.—Yes, that is correct.

Q.—Will you state, Mr. Gleason, what is the significance of the tabulation which appears near the bottom of the memorandum on Sheet 3 of Exhibit 204-A?

A.—The areas as given there for the different sections of the river were determined from aerial photographs of the river, which we did not have in 1931, at the time we made up the area in 1931. We did not have any actual data as to the river surface at that time, so it had to be assumed, but in 1937 and 1938 there were aerial photographs taken of the entire river from Alcova to the State line, and these areas adopted in 1940 were taken from those photographs.

Q.—What is the significance of the variation in the tabulation labeled "Daily Loss—Second Feet"?

A.—The figures of daily loss in second feet are computed from the areas of the section and from the evaporation record at

Pathfinder reservoir. That evaporation record was also corrected in 1940 to take in the years of record that had accumulated since 1931, and a co-efficient of seventy per cent is used to reduce the evaporation records with a standard Weather Bureau Class A pan to open water. (27985) surfaces.

Q.—And the area to which you apply this corrected evaporation factor is the area shown in the first column of the table on Sheet 3, is that correct?

A.—That is correct.

Q.—Is there any discrepancy between the areas shown in the first column of that table and the comparable areas shown in Column 2 of the tabulation on Sheet 1 of the exhibit?

A.—The same values are used in Column 2 of Sheet 1. The area is the same as that used in the computation.

Q.—Have the losses computed in accordance with the table shown on Sheet 1 of the exhibit been used by you during the years 1940 and 1941 in determining the losses chargeable to storage water from the Pathfinder reservoir?

A.—We started off in 1940 to use them, but later in the year objection was raised by the Farmers Irrigation District as to the resulting computation of the natural flow at the State line, and, as a result of that—there was involved other matters, however, besides the evaporation, particularly the time interval—we abandoned that plan for the balance of the 1940 season and used a substitute plan for computing the natural flow at the State line. For the year 1941 my computations have been based again upon this plan which we proposed in May, 1940.

Q.—Why did you defer until 1941 the use of the plan which you originally proposed and originally used in 1940?
(27986)

A.—The substitute plan used in 1940 worked fairly well for the conditions we had then, but it involved an estimate of the tributary inflow below Pathfinder, and in 1940, for the months of August and September, the creeks were usually dry, or practically so, so they were not a factor in the problem. However, in 1941 we found there was considerable water in those creeks the greater part of the time, and the plan that we used in the latter part of 1940 did not appear to mbe to work any longer because there was no way of computing or estimating the inflow from those creeks and we were not able to obtain daily reports of the flow, and, therefore, it appeared to me that the original plan was best for the conditions that we have had this year.

Q.—Have you furnished your computations based upon the tabulation appearing on Sheet 3 of Exhibit 204-A, regularly to Mr. Willis during 1941 and during that period of 1940, or that portion of 1940, in which you used that method of computation?

A.—Yes, we have furnished him daily computations during the season when storage water was being run in the river.

Q.—Has Mr. Willis communicated any objection to you, or indicated that he had any objection to that method of calculation of evaporation losses?

A.—I do not understand that he is objecting to the method of computing the evaporation losses.

Q.—Has he communicated to you any objection to that method?

A.—Not regarding the evaporation losses. We have had some discussion (27987) regarding the matter of the time interval, for the water to flow from that section of the river, and possibly regarding the bank storage, and other factors that appear to be in the problem, but I do not understand and I have not understood that Mr. Willis has raised any question about the evaporation losses, although he has not given me any written communication verifying it.

Q.—I call your attention to the last paragraph of the letter which is contatined on Sheet 1 of this exhibit, and to the last sentence of this paragraph, which reads—"Until further checking has been given this matter, figures of Column 2 will be used." Have you had any notification or any other type of information from Mr. Willis that he is no longer satisfied with the figures in Column 2?

A.—I don't recall any. I don't find any communication in the files. I searched them rather carefully, and I do not find any communication further about that.

Q.—In your judgment is the exposed surface area on which the losses are computed, as shown on the third sheet of this exhibit, more accurate than that shown in Column 1 of Sheet 1 of the exhibit?

A.—Yes, it would be my opinion that the latter figure, determined from aerial photographs, was more accurate.

Q.—And there were no measurements of that type available in 1931, at the time that the figures shown in Column 1 of Sheet 1 were tentatively agreed upon?

A.—No. About all we did was to estimate that the river was about so wide and so long, and we made a very rough calcula-

tion of (27988) the area, and it appeared that we were quite materially in error.

MR. KIRGIS: That is all.

NEBRASKA CROSS-EXAMINATION, RECORD PAGES 27989 TO 28008.

(Page 27989)

Cross-Examination by Mr. Good:

Q.—Mr. Gleason, you have before you United States Exhibit 204-A, which Mr. Kirgis identified by you yesterday?

A.—Yes, I have that exhibit.

Q.—I note that the correspondence contained on these six sheets ends on May 29th, 1940, which is the letter on the sixth sheet, dated May 29th, 1940, from L. C. Bishop to yourself?

A.—Yes.

Q.—Is there any later correspondence relating to this subject between yourself and the Nebraska Irrigation authorities?

A.—There is other correspondence relating to the subject of the method of computing the natural flow, but I do not find anything else (27990) that seems to have any probable bearing upon this subject of evaporation losses. However, there is other correspondence which may relate in part to this matter.

Q.—You stated that in July of 1940 another schedule was adopted?

A.—Yes.

Q.—Do you have a copy of that schedule?

A.—I don't have it before me. I think I have it in my material somewhere. I took a little look for it this morning but I didn't find it.

Q.—That came about, I believe you testified, by reason of the complaints and disagreements as between the Tri-State and the Northport with reference to storage water for Northport and the carriage of that in the Tri-State Canal, is that correct?

Q.—Isn't that the fact, Mr. Gleason?

A.—As I remember, that particular complaint from the Farmers District was in regard to the amount of natural flow that they were receiving. I do not believe that the Northport was involved upon that particular occasion.

(27991)

Q.—At any rate, about the 25th of July, you came to Bridgeport and there you met with Mr. A. W. Hall, did you not?

A.—Yes.

Q.—Who is Mr. Hall?

A.—He was in charge of Mr. Willis' office at Bridgeport, as I remember, at the time. I don't believe Mr. Willis was there.

Q.—And Mr. Hall is second in command in that office?

A.—I believe so.

Q.—At that time, you and he worked out another schedule differing from that shown in United States Exhibit 204-A, did you not?

A.—Yes.

Q.—And Mr. Hall undertook to recommend that schedule to Mr. Willis?

A.—I suppose so. I am not sure about that.

Q.—Then, on July 31st, you and Mr. John Whiting of the Wyoming Irrigation Department came down and met at Bridgeport with Mr. Willis and Mr. Hall, did you not?

A.—I believe so.

Q.—And at that conference you agreed to abandon the May, 1940, schedule, and to adopt a new schedule, is that right?

A.—Yes, that is correct.

Q.—That new schedule was in force for the remainder of the season of 1940?

A.—That is correct.

Q.—Was anything said in that conference on July 31st, 1940, as (27992) to whether you would ever revert to the May, 1940, schedule?

A.—It was my understanding that we would adopt the plan only for the time being for trial, and to get by the difficulty that we were having in trying to agree, under the conditions that then existed, upon a formula for computing the natural flow at the State line available to the Tri-State and Fort Laramie Canals, but it was never my intention to agree to it as a permanent formula.

Q.—The only thing that Exhibit 204-A shows as to the agreement by Nebraska to the May, 1940, schedule is the statement—"Until further checking has been give this matter, figures of Column 2 will be used"? That is found in Mr. Willis' letter of March 20th and is Sheet 1 of Exhibit 204-A?

A.—Yes.

Q.—That is all you have from Mr. Willis as to his agreement, is it not?

A.—I believe so.

Q.—So that Mr. Willis' agreement to the May, 1940, schedule, was likewise tentative?

A.—Yes, that is correct.

Q.—There was nothing said on July 31st, 1940 in the conference held at that time, about your reverting to the May, 1940, schedule?

A.—I don't remember what was said at the conference regarding that, or whether the matter was mentioned at all. I don't remember that it was.

Q.—It really wasn't mentioned at all. That is what I was getting at.

(27993)

A.—I don't remember that it was.

Q.—Accordingly, for the remainder of the season of 1940, commencing with July 31, the computation of natural flow and storage at the State line was made on the basis of the schedule tentatively agreed upon on July 31st?

A.—Yes.

Q.—We do not have that schedule before us here?

A.—No, I don't have it before me.

Q.—Do you recall how it differed from the May schedule?

A.—It was an entirely different formula, and I don't remember it well enough to attempt to state what it was without having the instrument before me.

Q.—Did you ever send a written memorandum of that schedule to Mr. Willis or to the Nebraska Bureau of Irrigation?

A.—As I remember it, it was typewritten in Bridgeport and they sent me a copy, I believe. I am not sure about that, however.

Q.—Mr. Whiting neither agreed nor disagreed in this conference on July 31st, 1940, as to whether that was acceptable to Wyoming or not, isn't that correct?

A.—As I remember it, that is correct.

Q.—Mr. Whiting was the State Hydrographer of Wyoming?

A.—Yes, I think that is the correct title.

Q.—At any rate, he was there representing the Wyoming State Engineer, Mr. Bishop, was he not?

(27994)

MR. WEHRLI: That is objected to as calling for a conclusion and an opinion of the witness, as undoubtedly it calls for an interpretation of the laws of Wyoming.

Q.—Would you answer the question, if you can?

A.—I was not advised as to whether he was sent there as a representative of the State Engineer or not.

Q.—Did you inform the State Engineer of Wyoming that you were about to have this conference on this subject previously to July 31st?

A.—I think not. It was a rather informal conference, and I don't think that I did advise Mr. Bishop.

Q.—How did Mr. Whiting happen to come up there?

A.—I don't remember. I expect that—he was located at Torrington, and we probably called him on the phone or happened to see him and invited him down.

Q.—Earl Lloyd was also there, was he not?

A.—I don't remember.

Q.—He is the Deputy State Engineer of Wyoming?

A.—I believe so.

Q.—So, at least, Earl Lloyd was notified of that meeting, was he not?

A.—I don't remember.

Q.—When was there next any discussion between you and anybody connected with the Nebraska Bureau of Irrigation as to the adoption of the schedule for computing the losses and the amount of natural (27995) flow and storage at the State line?

A.—That matter has been informally discussed upon quite a number of occasions. I don't remember the dates. I think, however, that we did discuss the matter again in 1940, in the fall.

Q.—About when?

A.—I don't remember.

Q.—Was any conclusion reached at that discussion in the fall of 1940?

A.—No, not as far as I was concerned.

Q.—About May 4th, 1941, you called Mr. Willis by telephone and asked to make an appointment to discuss the schedule with him and Mr. Whiting, did you not?

A.—I believe so.

Q.—And Mr. Willis told you to take it up with Mr. Hall, and suggested the next week as the time for the conference?

A.—That is correct, as I remember it.

Q.—On May 27th, then, which was Tuesday, you and Mr. Whiting came to the office after lunch at Bridgeport, did you not?

A.—I think that is correct.

Q.—And discussed the determination of a formula on this

problem of natural flow and storage reaching the State line?

A.—Yes.

Q.—Do you recall that a tentative plan was agreed upon by those present which you undertook to submit in writing?

A.—We tried to find a formula based upon some past figures that (27996) would apply, and we did discuss a tentative outline of such a formula.

Q.—And that formula differed from the one of May 20th, 1940, did it not?

A.—I believe it did.

Q.—And differed also from the one of July 31st, 1940?

A.—Yes.

Q.—It related largely to the question of the time interval or lag in getting the water from the Alcova reservoir to the Guernsey reservoir, did it not?

A.— Yes. That has always been the main point of discussion and it was discussed in this meeting—the time interval of water to travel from Alcova to Guernsey, which is variable. It varies with the amount of water flowing in the river and it varies with the change in the flow that is made—a large change in the flow apparently travels at a different rate than a small change—and it is a very, very problematical factor to attempt to make a formula to fit, and frankly, I have not been able to make one, and I would be glad to continue the discussions with Mr. Willis and the State Engineer of Wyoming to see if such a formula can be made.

Q.—For the purposes of day-to-day deliveries, it is very important to have that time interval correct, is it not?

A.—Yes.

Q.—In other words, the river cannot be administered as between natural flow and storage at the State line without having a reasonably (27997) correct time interval figure, isn't that right?

A.—Yes, that is correct.

Q.—So that the operation of the entire schedule depends upon that time interval as one of the factors?

A.—Yes, the exact formula used for the time interval affects the figure, the computed figure, for the natural flow from day to day. It is not so important as reflecting overall figures for the natural flow over a period of a month or season, but it is important from an administrative standpoint to have a fairly accurate figure every day.

Q.—The discussion on May 27th, 1941 revolved about an at-

tempt to apportion the differences in flow and the time interval of the different percentages of the change in flow, did it not?

A.—Yes. For instance, it appears from a study of past records that, for example, with a flow of four or five thousand second feet in the river, a sudden reduction of, say, a thousand second feet at Alcova begins to reach Guernsey in two days, but it is not complete, apparently for four days, and that is the reason that the ordinary three-day interval which we used in a calculation does not fit, and it seems necessary to make another correction to account for that. For instance, it does not affect the overall losses over the total period, but for the second day we have to use a correction, perhaps a plus correction and then deduct it out again on the third and fourth days, and at the end of that time the adjustment has been made and it comes out so that the river has been neither depleted (27998) nor any accrual made of the natural flow, or storage, either.

Q.—At any rate, you reached a tentative agreement on May 27th which you were to reduce to writing, but, for some reason, you didn't?

A.—I think I promised I would attempt to reduce it to writing, but after further study, after I returned to Guernsey and gave the matter further study, I decided that it was of very doubtful practicability, and after starting in the season I attempted to use it but I was not very successful at it, and I finally largely abandoned it.

Q.—That is, you started out the season of 1941 with the May 20th, 1940, schedule, modified by this verbal discussion of May 27th, 1941, and then abandoned that, is that correct?

A.—In my computations for 1941, I did not use the schedule that we attempted to set up in the spring of 1941 at all. I really abandoned it after the computation of the storage and carriage losses was started.

Q.—Did you ever discuss with Mr. Willis or Mr. Hall about the abandonment of that tentative agreement of May 27th, 1941?

A.—Well, I believe so.

Q.—Do you recall when?

A.—No, I don't, but it was a very informal discussion. We had no further formal meetings regarding the matter during the irrigation season. However, I sent him the daily computations.

Q.—You sent him the daily computations, but you never had any discussion after May 27th, 1940, with either Mr. Willis

or Mr. Hall (27999) as to what formula would be used for the year 1941?

A.—The computations themselves show the method being used, and their attention was invited to that, at least informally.

Q.—Yes, but you never actually discussed with him whether it was agreeable with him or with Mr. Hall for you to use the May, 1940, schedule for the season of 1941?

A.—The May, 1940, schedule merely referred to evaporation losses. It did not refer to this matter of time interval correction at all. The May, 1940, schedule covers evaporation only, and it is not a complete formula. It never was and is not yet.

Q.—So that there is no complete formula agreed upon in connection with this matter of losses since the abandonment of the 1931 schedule, which was Nebraska's Exhibit 88-A?

A.—The 1931 schedule likewise was only the rate of evaporation losses, and this other matter of time interval correction was not covered in 1931.

Q.—You have had no further discussion with Mr. Willis or Mr. Hall since May 27th, 1941, as to what time interval correction shall be used?

A.—I have contacted Mr. Willis' office rather recently regarding a further consideration of the matter.

Q.—That is the correspondence where you wrote him on October 1st, 1941, but aside from that correspondence, you have had no discussion with him as to what was or was not to be used in the season of 1941?

(28000)

A.—That is correct.

Q.—In connection with this time interval correction, you applied such a time interval correction in the so-called run sheets from time to time during the season of 1941?

A.—Yes.

Q.—Sometimes that would be a plus quantity and sometimes a minus quantity?

A.—Yes.

Q.—The purpose of that was to create some kind of a balance and correspondence between your computed run sheets and the actual measurements of the water?

A.—No, it was not for that purpose. The purpose of that was to keep the natural flow at the State line at some reasonable figure in proportion to what was put in at the upper end of the

section. We find that if we knew (use) the straight three-day interval correction, in case of large changes of flow in the river that we get very erratic figures for the natural flow at the State line, and at Whalen. It might come out exact one day and be off a thousand second feet the next.

Q.—And it might come out a minus quantity?

A.—Yes, it might come out a minus quantity, and that is the reason for these corrections, is to try to keep the natural flow at the figure that it would appear should obtain if there was no storage in the river.

Q.—In making this time interval correction, you use your best (28001) judgment, based upon your experience on the river and your observation of what conditions were in the river, and, using that judgment, you arrive at the figure for this time interval correction, do you not?

A.—Yes, it is a more or less arbitrary correction, and that is the particular thing that Mr. Hall has objected to. He would like to have a formula so that it would not depend upon the judgment of somebody, but it could be referred to a formula, and that would be a very desirable thing to do, if it can be worked out.

Q.—But during this season of 1941, you frequently applied this time interval correction in sometimes a plus quantity and sometimes a minus quantity?

A.—That is correct.

Q.—Using your judgment as to how much natural flow you thought ought to have been at the State line at that time, in view of the amount that came in at Alcova a few days earlier?

A.—Yes. For instance, if a change in the flow in the river upset the natural flow that had obtained a few days previously, under what we might refer to as steady flow conditions, and upset it wholly due to a change in the storage flow, this correction was made to bring the figure to figure that had been relative to what it had been under steady flow conditions?

Q.—Bringing the figure to a figure that you felt would be reasonable, in view of all the conditions?

A.—That is correct.

(28002)

Q.—Now, the results of this operation have considerable effect upon the actual operation and the administration of the river under Mr. Willis in the region between the State line and Bridgeport, do they not?

A.—Yes , it is quite important, I believe, from Mr. Willis' standpoint of administration to determine that natural flow figure for all canals that have no storage rights in there and have to be administered upon a priority basis.

Q.—If there is an error in a series of four or five days as to the amount of natural flow in relation to the storage, that might mean that a natural flow canal might get more or might get less than its due allotment of water, isn't that right?

A.—That might be true over a very short period. However, the corrections made which are shown in the work sheets as plus or minus storage in that section of the river are made to balance out in such a way that over the season there is no robbery of natural flow or storage and no particular accrual to it as a result of this method of calculation.

Q.—That is, an attempt is made to balance out, according to your judgment of what ought to be the amount of natural flow and storage at the State line, is that right?

A.—It is not balanced out according to judgment. It is balanced out mathematically.

Q.—But it is balanced out mathematically upon what factors?

A.—Upon the factors of plus and minus channel storage, if you (28003) want to use that term. If we plus storage into the channel some days, we minus the total of the same amount later on to make it balance out.

Q.—That is to say, and you just testified in that way, that your balancing out of these plus and minus quantities that you put in is based upon your judgment of how much natural flow and storage water is at the State line, in view of the conditions and the quantities of natural flow and storage at Alcova?

A.—Yes, that is correct.

Q.—Accordingly, the plus or minus corrections are based upon this matter of judgment.

A.—Yes.

Q.—And the balancing out is based upon this matter of judgment?

A.—I might say that for this year I did at various times attempt a formula—whenever the natural flow was depleted more than about two hundred second feet, I always took enough storage loss or correction to prevent a greater depletion than that, and I have another rule for the time interval which I call the ten-twenty-thirty rule. In case of a change in the river flow,

with an adjustment from hour to hour of a considerable amount, and the time interval is less than three days for the start of the change at Guernsey, I made a correction for the second day of thirty per cent of change of the flow, either plus or minus, depending upon whether an increase or a decrease in the flow was involved, and for the third day a correction of twenty per cent, and the fourth day ten per cent, with the (28004) opposite sign to what was used for the second day. That formula shows some promise of working in these changes, but we don't have enough examples to say definitely that it will work in all cases.

Q.—You didn't use that continuously throughout the season?

A.—I don't believe I did.

Q.—If, as the result of an error on one day which you tried to balance out by a corresponding correction figure on a succeeding day, if a natural flow canal was deprived of natural flow water—

A.—Your question started "as the result of an error." I don't understand what is meant by that.

Q.—I don't mean exactly an error, but as a result of wrong figures due to not making a proper time interval correction. As I understand it, the purpose of the balance figures that you put in afterwards is because, in running the water down to the State line on one day, you have not given quite the correct figure, so you have to balance it by a corresponding plus or minus a few days later, isn't that the way you did it?

A.—The purpose of this correction is to give a more correct figure than would be determined by the straight three-day interval figure. That is the purpose of it.

Q.—You said that Mr. Hall from time to time during the season of 1941 discussed with you this time interval correction?

A.—We may have discussed it over the phone a few times. I don't remember that we had any meeting or conference about it.

Q.—Did he ever see fit to consider this time interval correction (28005) which you applied an accurate correction?

A.—No, I don't think so.

Q.—Did Mr. Willis ever say that, or say that in substance, to you?

A.—No. The matter is still wide open for discussion. They have never agreed to it and neither have I.

Q.—And they never agreed to use the May, 1940, evaporation figures for the season of 1941, have they?

A.—As to the evaporation, I do not find anything later than Mr. Willis' communication of March 20th, 1940.

Q.—You refer to this—"Until further checking has been given this matter, figures of Column 2 will be used"?

A.—Yes, as far as evaporation is concerned, I haven't had anything further from him regarding that phase of it.

Q.—Then, since March, 1940, there have been three experimental schedules, each of them in an attempt to work out something, is that right?

A.—Yes, pertaining to the time interval correction.

Q.—Well, the evaporation figures have been agreed to by Mr. Willis only until further checking has been given, isn't that right?

A.—That is the way the matter stands regarding evaporation, as I understand it.

Q.—And you have an experimental schedule of May 20th, 1940, another one of July 31st, 1940, and then for the season of 1941 you reverted to the May, 1940, schedule of evaporation and applied the (28006) time interval corrections?

A.—As far as evaporation is concerned, I never have departed from it except as it is involved in the plan we used in the latter part of 1940. That plan did not require the use of the evaporation figures directly. We considered them in arriving at the plan—I did, at least.

Q.—In arriving at the formula?

A.—Yes.

Q.—You arrived at a formula which involved the use of the evaporation figures but you did not directly apply the evaporation figures under that formula?

A.—No, not under that formula.

Q.—I believe you stated that at no time did either Mr. Willis or Mr. Hall tell you that Nebraska agreed to reverting to the May, 1940, schedule for the 1941 season?

A.—That is correct.

Q.—Mr. Gleason, there are other elements besides the actual evaporation that enter into the computation of the whole balance of natural flow and storage at the State line, are there not?

A.—Yes.

Q.—You have mentioned this time interval lag?

A.—Yes.

Q.—That is also sometimes called channel storage, is it not?

A.—Yes, I think we have used that term.

Q.—Then, there is what is called bank storage, which means water (28007) which is, we might say, pressed into the dry banks when the river rises, and some of it comes back in a later part of the season, or when the river drops. That is what is called bank storage, is it not?

A.—Yes.

Q.—And then, in addition, there is transpiration from vegetation which is in or immediately adjacent to the channel? That is another element that enters into the conveyance loss between Alcova to the State line?

A.—Yes.

A.—It is generally conceded there are such losses by transpiration, but whether they have any effect upon the carriage of storage water, I rather doubt. Whether the transpiration losses occur whether there is storage in river or not, I wouldn't say. I don't believe that that would make much difference.

Q.—It might make some difference, due to the fact that the carrying of storage water in the river would incerase the quantity of water in the river, and the river thereby may reach some vegetation that the river would not reach if the channel were in its natural state, isn't that correct?

A.—That is probably correct, yes.

Q.—Then, in addition to those elements, there are the matters of tributary inflow between Alcova and Guernsey and the matter of diversions between Alcova and Guernsey?

A.—Yes.

Q.—And those also enter into the picture as to the transmission (28008) losses between Alcova and the State line.

A.—Yes. As I testified yesterday, I believe the main reason that I abandoned this spring the 1940 tentative plan, which worked fairly well for the latter part of the 1940 season under conditions where there was practically no flow in the creeks between Alcova and Guernsey, that formula, as I remember it, provided that the flow in such creeks had to be estimated and added to the quantity that was otherwise determined by this formula. But starting 1941 we had an entirely different situation. All these creeks were carrying water and they carried water all during the season of 1941, and, therefore, it was either necessary to estimate the flow of those creeks, in the absence of

daily reports, which could not be arranged,—daily reports of the gauge heights—or the natural flow users might have been very heavily penalized due to not getting that water, and that was the reason, the primary reason, I did not attepmt to use that 1940 formula this year.

Q.—Now, this whole matter, ever since March of 1940, and right down to the present date, has been in an experimental stage, has it not?

A.—This matter of the time interval correction in the computation of storage water has been in an experimental stage for ten years, as far as I am concerned, and we haven't yet arrived at a formula that will hold up and work.

WYOMING CROSS-EXAMINATION, RECORD PAGES 28021 TO 28029.

(Page 28021)

Q.—I believe you stated that you are the Superintendent of Power for the Bureau of Reclamation?

A.—Yes.

Q.—By virtue of that position, you are the manager of the North Platte project?

A.—Yes.

Q.—How long have you occupied that position?

A.—About eleven years. I think it will be twelve years next February.

Q.—When was the first year that any attempt was made to make any segregation as to the quantity of natural flow and storage arriving either at Guernsey or at the Wyoming-Nebraska line?

A.—This plan adopted in 1931 was the first time, so far as I know, that there was cooperation with the State of Wyoming and the State of Nebraska in attempting to formulate a plan for doing that. That had been a problem to some extent previously, but there never had been much occasion to determine the figure previously, but there never had been much occasion to determine the figure previous to 1931.

Q.—Isn't it a fact, Mr. Gleason, that previous to 1931 no determination of natural flow and storage below Pathfinder reservoir had been used in any way, as far as the operation of the North Platte project was concerned?

A.—I wouldn't be able to say as to what had been done before I arrived on the project in 1930. However, I did, in starting out myself in 1930, begin to study that question, but it was not until

1931 (28022) that we arrived at the cooperative plan that we used for carrying it out.

Q.—In the year 1930 you made no day-to-day determination, did you?

A.—No, I don't think so. There was no allotment of water, and I don't think there was anything done on that in 1930, as I remember.

Q.—When you came to Guernsey and took that position, you didn't find any record in the office indicating that any such determination had been made in any year prior to 1931, did you?

A.—The records did not contain any determination of storage and natural flow, so far as I know.

Q.—Prior to 1931?

A.—Yes.

Q.—You were not located at Guernsey before you took this position of Superintendent of Power?

A.—No, I was not located on the North Platte project previous to that.

Q.—But, as far as you have information on the subject and from what is reflected from the records in your office, no determination was made as to natural flow and storage at Pathfinder and between there and the Wyoming-Nebraska line until 1931?

A.—I don't think there is any record of any such determination. However, there must have been some determination made in previous years, for, otherwise, we would have had no basis for operation and release of water.

(28023)

Q.—Isn't that just a conclusion of yours, Mr. Gleason? If there was an adequate supply at all times, it wouldn't make any difference whether there was any determination or not, isn't that correct?

A.—That is more or less true, but I am incluined to think that the matter had been given consideration in previous years by whoever was handling the releases at Pathfinder. There must have been, but, as I say, there have been no records made showing the separation of the natural flow and storage.

Q.—Well, at least, when you came to that question, and in 1931 found what you considered to be a necessity for making such a determination, you had no schedule or basis for the making of it, did you?

A.—As I remember it, when I first went there I was told by

Mr. Stetson, my predecessor, of a formula that he had used which was based upon releasing of sufficient water to take care of the Warren Act schedules in addition to the strictly Government canals, but I don't remember the formula used or exactly how it worked, but we found that, as water became scarce in 1931, it was necessary to get down a little closer to some actual figures that had been used before when there was plenty of water at all times, and that was the erason for the study we gave the matter starting in 1930 and culminating in this plan that was adopted cooperatively.

Q.—Mr. Gleason, it is a fact, is it not, that until the 1931 plan was adopted, which is reflected in Nebraska Exhibit 88-A, you had no basis for making a determination?

(28024)

A.—I wouldn't say we had no basis. There is always a basis for a determination of some kind.

Q.—At least, none had been agreed upon by the interested parties?

A.—Yes, so far as I know, there had been on agreement between the States about it.

Q.—Mr. Gleason, the problem of making a segregation of natural flow and storage in the North Platte River below Alcova is a very complicated and difficult one, is it not?

A.—Yes, it is quite complicated.

Q.—There are a great many variable factors, are there not?

A.—Yes.

Q.—And conditions change from day to day, of course?

A.—Yes.

Q.—And conditions change even from hour to hour?

A.—Yes, that is true.

Q.—So that, commencing, for instance, at the upper reaches, you first have to make some computations to arrive at the inflow at Seminoe and the inflow between Seminoe and Pathfinder, do you not?

A.—There is a gauging station below each of these three upper dams.

Q.—You spoke of using data on the Medicine Bow River?

A.—Yes.

Q.—And you us data on the Sweetwater River, do you not?

A.—I don't believe I answered your question about three questions back. You asked about computing the inflow of the

reservoir, (28025) if I got you correctly. The method of doing that is to take the measured outflow of the reservoir and correct it each day for the change in storage content as shown by the table and the evaporation loss, and by that method we arrive at the computed inflow of each of those three reservoirs and a record is made of it.

Q.—I am glad you called my attention to the impropriety of my question, Mr. Gleason. What I meant to inquire about was your using the values on the Medicine Bow, and perhaps I did not understand the connection in which you used those values.

A.—Yes. This year we used the actual measured values of those inflows rather than arithmetical combinations of the computed inflows, because we find it gives more consistent figures, because by the time we work water through the reservoirs, with the inevitable errors in the observation of the reservoir elevations, we get some rather fantastic figures by the strictly computation method. It is very easy to read the reservoir water surface in the morning two or three inches too high or too low, or the wind may be blowing the water up near the gauge, and it is to smooth out those computed figures which, for the daily use, became rather erratic, especially now when we have three reservoirs to work the water through, and that is the reason I believe it is better to use actual measured inflows, even though we have to do a little estimating on the small streams.

Q.—Of course, that latter method that you have described is subject to some inaccuracy because of unmeasured flows?

A.—Yes.

(28026)

Q.—Then, below Alcova, of course, there are a number of tributaries that sometimes carry water and sometimes do not between Alcova and Guernsey?

A.—That is correct.

Q.—And the run-off of these tributaries fluctuates quite widely from day to day, doesn't it?

A.—Yes, that is true, and they have storms in there and the flow may be changed very radically in two hours.

Q.—And the rate of evaporation changes from day to day, does it not?

A.—Yes. On the reservoirs, we use the daily evaporation for the daily correction. However, in this formula we have used on the river for evaporation correction, we don't attempt to get

to that refinement. We use the mean monthly figures and we do not attempt to correct the river for daily fluctuations in evaporation.

Q.—That is the point I wanted to bring out—that you use the monthly value based upon a certain period of time in making the day-to-day computation of the natural flow and storage, which does not reflect the actual conditions as they exist from day to day?

A.—That is true.

Q.—There may be a cloudy day, or some rain over the area, when, of course, the evaporation is much lower than it would be in your monthly average, that is true, isn't it?

A.—It might be either lower or higher.

Q.—If that period of cloudiness and rain continued for perhaps (28027) a week, or several days, the monthly value, the actual value, might be very seriously affected as compared with the overall average that you use?

A.—I doubt if the word "seriously" should apply. I don't think that the differences would be sufficiet to attempt to use daily figures on the river. At least, that has always been my impression. The computations are now becoming so burdensome that it takes a great deal of time to make these computations, and that would simply add another detail that we had to determine each day. My personal opinion is that it is not worth while to go into that.

Q.—It is a fact, is it not, for the 1931-1939 period, inclusive, you used the evaporation rate which historically occurred in the 1921-1930 period?

A.—Yes, that is correct.

Q.—Now, as a matter of fact, Mr. Gleason, the evaporation rates were actually much higher, were they not, in the 1931-1939 period on account of the higher temperatures and smaller precipitation than was the case in the 1921-1930 period?

A.—Yes, evaporation was slightly higher in the later period.

Q.—You say "slightly." You don't have any figures indicating just the extent, do you, in inches—the difference in inches?

A.—No, I don't have the figures with me, but they are available.

Q.—Yes, they may be available in the record in this case in some of the exhibits.

A.—However, of course, during the same period we are using

this (28028) area of river surface that we found by a later survey was apparently very excessive, so it would more than offset the other effect due to the evaporation figure being low.

Q.—But, giving consideration to all of these factors, there isn't any way of making any accurate determination, day to day, of the actual balance of natural flow and storage at either Guernsey or the Nebraska-Wyoming line, is there?

A.—That term "accurate" depends upon what is accurate.

Q.—I mean this, Mr. Gleason—if there is 5,000 second feet of water arriving at Guernsey, is there any way that you can correctly and accurately determine that 2,500 for instance, is storage and that 2,500 is natural flow?

A.—Oh, I believe that we arrive at a figure that is correct enough for administrative purposes. It must be realized that an error of ten second feet in five hundred is inevitable. All hydrographic records are inaccurate to a varying extent, and the computations based upon them, and based upon assumptions as to evaporation in preparing formulae, so the judgment of the men doing it enters into the final figure, and the most we can hope to do is to arrive at daily figures which, summed up over a period of time, will more closely approximate the accurate figures than the daily figures taken individually do.

Q.—Do you think there might be an error of ten second feet in five hundred second feet?

A.—I would be surprised if you came that close.

(28029)

Q.—If there were five thousand second feet, the error would be on the same basis, or one hundred second feet?

A.—The only trouble in attempting to determine the error is that you have no standard to compare with. Somebody else might figure it and say that you are in error, but has he based his figures upon the same ones that were used by the same man?

Q.—Well, Mr. Gleason, as a matter of fact, after ten years' experience, as your testimony indicates, you haven't found any satisfactory way of making this determination?

A.—Not entirely satisfactory. We haven't found any rigid formula that would fit.

Q.—Of course, you hope to find something in the future, but only the future can tell whether you will find any satisfactory way or not?

A.—That is correct.

Q.—And, in any event, assuming that it could be done, it is a very laborious and difficult task, is it not?

A.—Well, there is considerable work involved and it is becoming more burdensome with the additional reservoirs.

Q.—And the operation of the Kendrick project will probably add some additional complications, will it not? That is, it will divert from the Alcova reservoir, and there will be questions of return flows and problems of that kind that will further complicate the situation?

A.—Very likely.

U. S. EXHIBIT No. 204-A

Sheet 1

Bridgeport, Nebraska
March 20, 1940

TABULATION OF RIVER AREA BETWEEN SEMINOE RESERVOIR IN WYOMING AND THE WYOMING-NEBRASKA LINE AS PREPARED BY SEVERAL INDIVIDUALS AS FOLLOWS:

Sections	(1)	(2)	(3)	(4)
Seminoe Reservoir (full)				
Pathfinder Dam to Guernsey Dam	16,700			
Pathfinder Dam to backwater Alcova Reservoir		190	190	190
River Section Alcova Reservoir		240		
Alcova Dam to Backwater Guernsey Reservoir		8,360	8,360	9,090
Guernsey Reservoir (full)		2,300		
Guernsey Dam to Whalen Dam	1,000	560	562	520
Whalen Dam to State Line	6,000	2,430	2,432	2,560
Totals	23,700	14,080	11,544	12,360

First Column represents area tentatively agreed upon by State Engineer Whiting of Wyoming, C. F. Gleason, Supt. of Power, U. S. Bureau of Reclamation, and R. H. Willis, Chief of the Bureau of Irrigation of Nebraska, in May, 1931. Abandoned March, 1940.

Second Column submitted by C. F. Gleason, computed from aerial survey maps.

Third Column from testimony in Wyo-Nebr. case by Mr. Keimig.

Fourth Column computed from aerial survey maps, borrowed from C. F. Gleason, by N. S. Dodd.

Letter file contains references to the areas tabulated and the figures show discrepancies that are not accounted for on this date. Until further checking has been given this matter, figures of Column Two will be used.

(Sgd.) R. H. WILLIS,
R. H. Willis, Chief, Bureau of Irrigation, Water Power and Drainage.

U. S. EXHIBIT No. 204-A
Sheet 2

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
Guernsey, Wyoming

May 20, 1940.

Mr. R. H. Willis, Chief,
Bureau of Irrigation, Water Power and Drainage,
State of Nebraska,
Bridgeport, Neb.

Dear Mr. Willis:

Enclosed herewith are new instructions for computing reservoir evaporation losses and river carriage losses that have been prepared for this season.

No change is proposed in the method previously used except as follows:

(a) The evaporation for Guernsey reservoir will be separately computed in the same manner as for the other reservoirs.

(b) For river carriage evaporation losses the average Pathfinder evaporation for the period 1921 to 1939, inclusive, is proposed as a basis instead of 1921 to 1930.

(c) The area of water surface of the different river sections is based upon the aerial photographs made in 1939 and previous years.

These instructions are satisfactory to the Chief Engineer, Bureau of Reclamation and are being submitted to the State Engineer of Wyoming for his consideration. Your comments will be appreciated.

Very truly yours,
(Sgd). C. F. GLEASON,
Superintendent of Power.

Encl.
CC—Commissioner No Encl.
Chief Engineer No Encl.
D. C., Billings No Encl.

Same letter addressed to Mr. L. C. Bishop, State Engineer of Wyoming, Cheyenne, Wyo.

U. S. EXHIBIT No. 204-A
Sheet 3

U. S. BUREAU OF RECLAMATION
NORTH PLATTE PROJECT
BASIS FOR COMPUTING RESERVOIR EVAPORATION LOSSES AND RIVER CARRIAGE LOSSES ON STORAGE WATER SEASON OF 1940

Reservoir Evaporation Losses

Seminoe, Pathfinder and Alcova Reservoirs

Evaporation will be computed daily based upon evaporation from Weather Bureau Standard 4-foot diameter Class "A" pan located at Pathfinder reservoir. Daily evaporation will be multiplied by area of water surface of reservoir in acres and by co-efficient of 70% to reduce pan record to open water surface.

Guernsey Reservoir

Compute same as above except use pan evaporation at Whalen Dam.

River Carriage Losses

River carriage losses will be computed upon basis of area of river water surface as determined by aerial surveys made in 1939 and previous years and upon average monthly evaporation at Pathfinder reservoir for the period 1921 to 1939, inclusive, using a co-efficient of 70% to reduce pan records to open water surface.

Daily evaporation losses in second-feet for various sections of the river is shown in the following table:

River Section	Table Area Acres	Daily Loss—Sec.-ft. May	June	July	Aug.	Sept.
Alcova to Wendover	8360	53	76	87	76	56
Guernsey Res. to Whalen	560	4	5	6	5	4
Whalen to State Line	2430	16	22	25	22	16

Above table is based upon mean evaporation at Pathfinder as follows: May .561 ft; June .767 ft; July .910 ft; Aug. .799 ft; Sept. .568 ft. Co-efficient of 70% to reduce pan record to open water surface.

Above table does not contain computed loss for section of river from Pathfinder dam to head of Alcova reservoir (area 170 acres) because this area is less than submerged area of original river bed in Alcova reservoir and is, therefore, considered as off-set.

Sheet 4

Likewise the area between Seminoe dam and head of Pathfinder reservoir is less than area of original river bed through Pathfinder reservoir—considered as off-set. Evaporation losses will be divided between natural flow and storage water flowing in any section of river channel upon a proportional basis. This proportion will ordinarily be determined at the upper end of the section except under conditions of intervening accruals or diversions that materially change the ratio of storage to natural flow at the lower end of the section. In such event the average proportion for the section will be determined by using the mean ratio for the two ends of the section.

U. S. EXHIBIT No. 204-A
Sheet 5

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
Guernsey, Wyoming

May 20, 1940.

Mr. L. C. Bishop,
State Engineer,
State of Wyoming,
Cheyenne, Wyo.

Dear Mr. Bishop:

Enclosed herewith are new instructions for computing reservoir evaporation losses and river carriage losses that have been prepared for use this season.

No change is proposed in the method previously used except as follows:

(a) The evaporation for Guernsey reservoir will be separately computed in the same manner as for the other reservoirs.

(b) For river carriage evaporation losses the average Pathfinder evaporation for the period 1921 to 1939, inclusive, is proposed as a basis instead of 1921 to 1930.

(c) The area of water surface of the different river sections is based upon the aerial photographs made in 1939 and previous years.

These instructions are satisfactory to the Chief Engineer, Bureau of Reclamation and are being submitted to Mr. R. H. Willis for his consideration. Your comments will be appreciated.

Very truly yours,
(Sgd.) C. F. GLEASON,
Superintendent of Power.

Encl.
CC—Commissioner No Encl.
Chief Engineer No Encl.
D. C., Billings. No. Encl.

Same letter to Mr. R. H. Willis, Bridgeport, Neb.

U. S. EXHIBIT No. 204-A
Sheet 6

STATE OF WYOMING
State Engineer's Office
Cheyenne

May 29, 1940

Mr. C. F. Gleason,
Superintendent of Power,
Guernsey, Wyoming.

Dear Mr. Gleason:

I hope you will pardon my delay in making reply to your letter of May 20, 1940, relative to computation of river losses, which I find at hand upon my return from the western part of the state.

The changes proposed appear to be reasonable and are acceptable to this office.

Yours very truly,
(Sgd.) L. C. Bishop,
L. C. BISHOP,
State Engineer.

EXCERPT FROM UNITED STATES EXHIBIT No. 266 SHOWING DIVERSIONS FOR LINGLE AND HILL IRRIGATION DISTRICTS UNDER THE INTERSTATE CANAL FOR THE YEARS 1930 to 1933 inclusive and 1937 to 1939, Inclusive

Year	Acre Feet
1930	42,986
1931	37,755
1932	46,159
1933	39,780
1937	46,980
1938	44,890
1939	48,360

U. S. EXHIBIT No. 265

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
WASHINGTON, NOV. 6, 1941

Office of the Commissioner
The Secretary
of the Interior.

Sir:

By reason of recent experience in the operation of the North Platte Project on the North Platte River in Wyoming and Nebraska and also by reason of the recent completion of the Seminoe and Alcova Reservoirs on that river and the current construction of the Kendrick Project, it seems desirable that I recommend to you at this time a method of operation of the reservoirs constructed by the Bureau of Reclamation on the North Platte River. In working out a plan to recommend, the Bureau has sought to conceive a method of operation which will utilize the available waters of the river to the geratest possible extent both for irrigation and for the development of power. Pursuant to the responsibility imposed on you by the Reclamation Act, primary consideration has of course been given to the conservation of water for irrigation purposes. It so happens that that obpective can be achieved without prejudice to the beneficial use of water for the generation of power also.

The Seminoe Reservoir, with its large power plant, is located but a short distance upstream on the North Platte River from the Pathfinder Reservoir. Those reservoirs are of approximately equal capacity, each being capable of storing slightly in excess of one million acre feet of water. To secure the maximum utilization of these facilities I recommend that all water which can be captured in the Seminoe Reservoir, to the extent of its capacity, be held in that reservoir and be released for the generation of power as needed, the water subsequently being recaptured in the Pathfinder Reservoir to the extent of its available capacity. Under such a plan irrigation demands will be met by the release of water from the Pathfinder Reservoir and, to the extent necessary if any, by additional releases from the Seminoe Reservoir and through the Seminoe power

plant. The first call on water for irrigation will be against the waters physically captured in the Pathfinder Reservoir. In this method of operation it is also recommended that the Seminoe Reservoir never be drawn down below 55,000 acre feet, the amount necessary to be held in that reservoir for the maintenance of an adequate head for the generation of power. I am satisfied that this 55,000 acre feet of water can be withheld in the Seminoe Reservoir without appreciable effect on the irrigation supply. Likewise it is recommended that Pathfinder Reservoir never be drawn down below 5,000 acre feet. This limitation is desirable from an administrative standpoint and for the preservation of fish life in the reservoir.

The Alcova Reservoir lies about eight miles down stream from the Pathfinder and has a total capacity of approximately 190,000 acre feet. Of this total capacity approximately 176,000 acre feet must be filled to make possible a diversion of water for the Kendrick Project through the Casper Canal which has its headworks at the reservoir and at an elevation above the natural bed of the stream. In these circumstances it is recommended that, when irrigation on the Kendrick Project is commenced, the Alcova Reservoir be kept filled to the minimum extent of 176,000 acre feet, or to the extent necessary to allow diversion through the Casper Canal. The remainder of the capacity of the reservoir will be utilized to the fullest extent possible for the conservation of waters which cannot be captured or held in Seminoe and Pathfinder. After irrigation of the Kendrick Project is commenced, the Alcova Reservoir will be drawn down below the 176,000 acre-feet level only in either of two circumstances: (1) when the irrigation seaeson for the Kendrick Project has closed in the fall prior to the closing of the season on the lands of the North Platte Project down stream at lower elevations in which case the requirements of those lower lands may be met from Alcova Reservoir; (2) when the available irrigation water in the Seminoe and Pathfinder reservoirs is exhausted.

The Guernsey Reservoir is a storage and regulating reservoir of approximately 50,000 acre feet capacity lying about one hundred fifty miles down stream from the Alcova Reservoir and lying shortly above the point of diversion of the two main canals serving the North Platte Project One of the main canals of the Project, the Interstate Canal, serves an off-channel reservoir known as Lake Minatare which has a capacity of approxi-

mately 60,000 acre feet and which is so located that it serves as a supplemental source of supply for a large acreage of project lands. During the severe portion of the water season water cannot be run to the Lake Minatare Reservoir because of ice conditions on the Interstate Canal. Consequently storage in that reservoir must be accomplished during fall and spring months.

For the greatest conservation of water for irrigation purposes it is recommended that all water available at Guernsey Reservoir between October 1 and November 15 of each year be run through the Interstate Canal into Lake Minatare to the fullest extent possible. On or shortly after November 15 the Interstate Canal becomes unusable for the remainder of the cold weather. From then until April Guernsey Reservoir will store water to the fullest extent possible. During April as much water as possible which has been stored in Guernsey Reservoir during the winter will be run through the Interstate Canal to fill any remaining capacity in Lake Minatare and also to fill Lake Alice, another small off-channel reservoir fed by the Interstate Canal. This April run of water will be to the full extent of the remaining capacity in Lake Minatare and also the capacity of Lake Alice. Guernsey Reservoir will then be used to capture as much of the spring-run-off as its capacity will permit.

The plan outlined in the preceding paragraph is, of course, dependent on the operation of Guernsey Reservoir in such a manner as to make possible the capture by it and utilization of the maximum amounts of water. To make this plan fully effective the maximum possible amount of storage capacity must be available in this reservoir on October 1, the end of the irrigation season. Consequently it is also recommended that Guernsey Reservoir be used for the satisfaction of late irrigation season demands to the fullest extent possible and that, as a result of that operation, Guernsey Reservoir be pulled down to not more than 5,000 acre feet of water as of October 1 of each year.

This proposed plan of operation has been given careful and extensive consideration by operating and supervisory personnel of the Bureau and by me. I am convinced that it presents the method of operation best calculated to conserve and utilize the waters of the North Platte River available for use under the Reclamation program. It is, of course, specifically recognized that the proposed plan of operation may be altered, in your dis-

cretion, if, in the future, changed circumstances which are not presently foreseeable require and warrant a change in the plan of operation.

I recommend this plan for your consideration and request that, if you approve it, you so signify by notation on this letter.

Respectfully,

Approved: NOV. 10, 1941 (Sgd.) H. W. Bashore
(Sgd.) John J. Dempsey Acting Commissioner.
Acting Secretary of the Interior.

INTRODUCTION OF UNITED STATES EXHIBIT NO. 265 BY MR. KIRGIS, COUNSEL FOR THE UNITED STATES

Record Pages 28597 and 28598

(28597)

MR. KIRGIS: There is now being distributed a document which has been marked for identification as United States Exhibit 265. This will not be offered in the usual manner, through the result of testimony given by a witness. There are certified copies of this document, and each of you, I believe, has been given at least one certified copy of the document.

This is a letter to the Secretary of the Interior from the Acting Commissioner of the Bureau of Reclamation, and approved, as noted in the lower left-hand corner of Page 3, by John J. Dempsey, Acting Secretary of the Interior, on November 10, 1941. This document prescribes a method of reservoir operation for the reservoirs of the Bureau of Reclamation on the North Platte River.

It is offered in evidence as proof of the action taken by the Secretary of the Interior in prescribing a method of reservoir operation to be followed. It also, as will be brought out (28598) later, constitutes a background for the method of reservoir operation adopted by this witness who is now on the stand in his water supply study.

Inasmuch as this is a certified copy of an official record of the United States Department of the Interior, on file in that Department in Washington, it is, I believe, admissible in evidence, and I offer in evidence United States Exhibit 265.

TESTIMONY OF BARRY DIBBLE, WITNESS FOR THE UNITED STATES CONCERNING POOLING OF RESERVOIR SUPPLIES IN THE UNITED STATES WATER SUPPLY STUDY

Record pages 29083, 29086

(29083)

Q.—As we understand the plan of operation, water may be temporarily (29084) detained in Seminoe for the purpose of creating a power head and fed out more slowly into Pathfinder, but that would be treated as Pathfinder water until the Pathfinder capacity was satisfied?

A.—You mean on the priority basis?

Q.—Yes, on the priority basis.

A.—I presume that is correct.

Q.—Now, in some years, upon an operation table operating the reservoirs on that priority, there would be no Seminoe water at all, isn't that right?

A.—Well, we carried through a study of that kind a number of years back—that was the first study we made—and we found that the first project to run out of water was the North Platte project, in 1934.

Q.—But in years subsequent to that—of course, the Seminoe would run out of water soon after that, would it not?

A.—No, it continued along until 1939 or 1940, I think.

Q.—Did that take account of the priorities of other projects down below, and their demands?

A.—Yes.

Q.—The Seminoe water, however, according to your plan of operation, is to be used indiscriminately with Pathfinder, for the purpose of supplying the projects down to the State line?

A.—That is the way we have made our computation. We haven't attempted to distinguish it.

Q.—You haven't attempted to distinguish it?

(29085)

A.—Just to determine what water is available.

Q.—You did not complete those studies which you said you started on the other basis?

A.—Yes, we carried them through to conclusion.

Q.—In that study, did you supply Pathfinder water indiscriminately to the projects between Alcova and the State line, regardless of whether they had storage rights or not?

A.—My recollection is not clear on that particular point, but I think they were allowed in the study the water they took historically. I think we were not able to distinguish that water —we did not attempt to do so.

Q.—It would make some difference, would it not, if you put them on that basis?

A.—It would make a relatively small difference. The relative quantities of water that are involved are so much larger for the North Platte project, the effect up above is not greatly material. Of course, there would be some effect. Even in that case, if my memory is clear on the subject, I recall we started out with the assumption, after one or two trials to see how it worked, that we only allowed the North Platte Project, after water became short, after the reservoirs ceased spilling, to use 75 per cent of what they used during the period of 1931, 1932 and 1933, and that even with that cut, the North Platte project, depending on Seminoe alone, ran out of water in 1933.

Q.—You mean depending upon Pathfinder alone?

(29086)

A.—Depending on Pathfinder alone, ran out of water in much the same way in 1934 that they did historically—the same effect occurred in the period of record.

Gauging Station in Section 4-23-58W.
at Wyoming-Nebraska Line
Data from Nebr. Reports.

WYOMING EXHIBIT No. 150
1941

NORTH PLATTE RIVER
SPRING CREEK

Acre Feet

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Year	Oct.-Apr.	May-Sept.
1930															
1931															
1932	615	595	615	615	575	645	595	647	526	555	645	625	7253	4255	2998
1933	676	704	661	676	611	694	617	676	595	553	565	635	7663	4639	3024
1934	738	655	615	528	500	666	595	553	516	492	553	595	7006	4297	2709
1935	615	536	522	553	555	593	549	619	655	655	615	595	7062	3923	3139
1936	615	595	593	534	645	613	490	444	464	214	194	198	5599	4085	1514
1937	603	535	492	512	484	492	476	464	500	668	524	522	6272	3594	2678
1938	595	557	565	579	555	583	567	803	708	657	575	740	7484	4001	3483
1939	551	718	684	712	587	609	607	520	956	744	702	569	7959	4468	3491
1940	583	1061	492	492	460	522	516	603	573	508	468	506	6784	4126	2658
Average	621	662	582	578	552	602	557	592	610	561	538	554	7009	4154	2855

Note: Due to incomplete record this Return Flow stream, entering Nebraska from Wyoming a short distance north of the main gauging station on the North Platte River, was omitted from Wyoming Exs. 86 to 95 and from later exhibits. This run-off enters the river above the Tri-State Canal head gate. The amount of run-off is to be added to Return Flow between Whalen and the Nebraska Line. In the Return Flow between Nebr. Line and Bridgeport the amount of water would show up as a channel accretion in the flows in the exhibits and is not to be added thereto. The amount of run-off should also be added as the inflow from Wyoming to Nebraska at the State Line. It has not been added in the Exhibits.

EXCERPT FROM UNITED STATES EXHIBIT 261, SHOWING REQUIREMENT OF THE FIRST UNIT OF 35,000 ACRES OF THE KENDRICK PROJECT

	Acre Feet
May	10,900
June	19,300
July	29,200
August	29,100
September	16,500
Year	105,000

TESTIMONY OF BARRY DIBBLE, WITNESS FOR THE UNITED STATES CONCERNING WINTER DIVERSIONS OF 73,000 ACRE FEET TO THE INLAND RESERVOIRS, LAKES ALICE AND MINATARE OF THE PATHFINDER IRRIGATION DISTRICT

Record pages 28696, 28698

(28696)

Q.—Will you refer, then, to Column 44, which is headed "Diversion at Whalen to Lakes Alice and Minatare," and will you explain the meaning of that heading and the derivation of the values of that (28697) column?

A.—Under the rules derived from United States Exhibit 265, water is run into the storage in the off-stream reservoirs, Lake Alice and Lake Minatare, during October and November of each year, and then in April, to complete the filling of the reservoirs. Such water is taken from the river during October and the first half of November as is available. During April the filling of the reservoirs is completed, and it is assumed that 73,000 acre feet will be used each year in that manner. These are the figures which are shown in Column 44, and entitled "Diversion at Whalen to Lakes Alice and Minatare."

Lake Minatare reservoir is very tight and very little seepage from it. Lake Alice leaks considerably. Therefore, it is assumed here that the water will be put into Lake Minatare that is held over the winter, and that Lake Alice will not be used

until the last thing, that is, the last water that goes down will be put in there. It will be noted in each year, under Column 44, that a total of 73,000 acre feet will be transmitted or diverted for those reservoirs.

Q.—Mr. Dibble, you stated a moment ago that it is assumed that 73,000 acre feet is the annual quantity diverted for those reservoirs. What is the basis of that assumption?

A.—That is based upon the quantity of water which it is estimated can be used from these reservoirs. Perhaps I had better put it in this way—it is the quantity of water necessary to supply the amount of water that would be used annually from the reservoirs in figuring the lands which are subject to irrigation from them or (28698) which are under them.

TESTIMONY CONCERNING SHORTAGE AS AN INHERENT FEATURE OF IRRIGATION DEVELOPMENT

Testimony of Mr. Patterson, Witness for Colorado,
Record pages 24304, 24305

(24304)

Q.—There isn't, as far as you know, any system of human operation of irrigation facilities that could meet varying climatic conditions with 100 per cent efficiency?

A.—No, that can't be done. I think we can go one step farther. We have heard of a situation involving a few days change that can unexpectedly occur in such a short period of time; that is to say, you may have a flood which would join with your released reservoir water and cause a waste of both. But there is the other element, the uncertainty of these more or less climatic cycles, not that they are of any fixed length, but they do occur; that is, there are plentiful years and there are short years, and there are favorable cycles and unfavorable cycles. And so far as I know, there is no one that has yet—science hasn't advanced far enough to predict far enough in advance to prevent drought or shortage from being an inherent feature of irrigation development. In the early days we thought irrigation would avoid the uncertainties of rainfall, and to some extent, of course, it does. But when you get down to talking about an entire stream basin and get to the stage of considering its ultimate development, you start from the fundamental consideration that it is in the public interest to put all this water to use.

(24305)

If on a stream basin we should determine the quantity during a period of drought or deficiency, and should devise works to use that quantity of water, then it would necessarily follow in all more favorable seasons that all of the surplus over that amount might be wasted On the other hand, if you devise your works for a very favorable water supply or have a supply based on a record of a few favorable seasons, then you have created a shortage condition that is adverse to the interests of that basin. So there must be a happy medium, the objective being to have shortages in water supply that are tolerated, and are more or less balanced off by the quantities that will be wasted during cycles of more favorable water production.

Q.—If, for instance, you had an irrigation system devised to deliver a complete supply under unusual drought conditions, then in other seasons you would have a considerable supply of water that would not be used.

A.—That is right.

Q.—And the development of the irrigated acreage would be substantially less?

A.—Yes, development would be halted before it had progressed to a point that is desirable from the standpoint of making as much use as possible of these available resources.

Testimony of United States Witness, Barry Dibble, Record pages 28764, 28765

Q.—Now, from your examination of the records regarding the water supply in the North Platte and Platte Rivers, and from your experience generally, have you formed an opinion concerning the prospects for future supply in this area?

A.—Yes, I have.

Q.—Will you state that opinion and the reasons for it?

A.—It is my opinion that the period 1930 to 1940 represents as low a water supply period as it is wise to prepare for or to construct for in the history of the North Platte River.

Q.—Now, based upon that opinion, what is your judgment regarding the propriety of the use of the historical period 1925 to 1940 in your water study?

A.—I believe, in following it through that period, the studies show that the supply can be made adequate for the entire period by conserving the water in the early years of the period

and using it properly during the later years. It is my opinion that that is the proper basis on which to determine the limit of the water supply on the North Platte River.

Q.—How do you reconcile that opinion with the fact that in your study there are occasional months in which you do not find a supply adequate to meet the requirements which you have placed on the river and found on the river?

(28765)

A—It is not economically sound to develop a river of this kind and entirely eliminate shortages. Irrigation propjects are not made infeasible because of occasional shortages in the water supply, and it is not economically sound to so plan that there will be no shortage at all.

Q.—Do you consider that the shortages which develop in your study are shortages that are not serious to the river itself and its needs?

A.—No, they are not serious to the river and not serious to the projects.

Q.—Now, considering your study, and based upon your experience in reclamation and irrigation matters, is there, in your opinion, any excess water not reasonably required for the Kendrick Project and existing irrigation developments, which could properly be used in new developments on the North Platte River?

A.—Yes, it is my opinion that there is.

Q.—Upon what do you base that opinion?

A.—This study shows that a considerable amount of water was spilled under the plan in 1928, 1929 and 1930, and later years, and if that water—water which would have been available in years of ample water supply prior to the 1925 year, when we started the study, as of September 30th, 1925—if it had been conserved economically, it would be available for other projects.

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